



Scanning -- Shortwave -- Satellites -- Ham Radio -- Computers

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Scanning in Paradise

Also in this issue:

Having Fun with GPS
UHF Military Frequency Assignments
Ft Lauderdale Air and Sea Show
Product Reviews, and more



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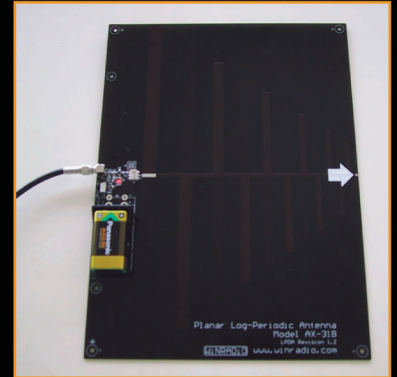
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- "The result was stunning: I got better picture than with the TV antenna cable connected to the CATV socket in my apartment... this unit doubles up as the finest indoor TV antenna I have ever seen!" *Radiomag and R&C*, Sep 2001
- "Its construction...is high quality throughout." *PopComm*, July 2002

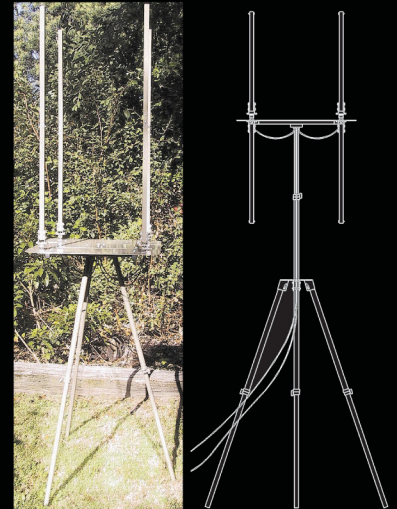


AX-31B antenna (battery not included)

NEW! AX-55D Direction Finding Antenna System

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- Performs well with any third party equipment, but is especially suitable for the WiNRADiO MS-8100 Multi-channel receiver units and WiNRADiO WA-0X11 antenna distribution units. Integrated with these units, it represents an essential part of a compact multichannel surveillance system, offering unbeatable performance at a surprisingly low price.



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Monitoring Times

Vol. 21, No. 8

August 2002



Cover Story

Scanning in Paradise

By George Furukawa

Should you take your scanner with you on a trip to Hawaii? Sure, why not? Local residents will assure you there's plenty to listen to, especially on the marine and aviation bands.

Public safety scanning is also active, though the systems used and amount of traffic will depend on your ultimate destination on the islands. Still, you can tune in to everything from amateur radio to boat traffic to rescues of stranded hikers. This article gives an overview of what systems and frequency ranges are used by Hawaii's most populated regions. You'll find everything from conventional VHF and UHF systems to Ericsson EDACS, EF Johnson Multinet, and Motorola Smartnet. Story starts on page 10.

On our cover: Diamond Head from one of the good vantage points for monitoring aircraft approaches to Honolulu. Photo by Ron Hashiro.

Having Fun with GPS.....14

By Anton Ninno and Jim Kuhl

Business applications for Global Positioning Satellite data have skyrocketed, but ideas for recreational use have been equally creative, if not more so. Don't read this article if you aren't prepared to run right out and buy a GPS receiver, or at least a topo map and a compass! Here's a great activity to share with the grandkids, but you'll have to get out of the radio shack ...

Who's Who in the Spectrum: VHF/UHF17

By Larry Van Horn

This installment of *MT's* guide to the radio spectrum covers 108 to 400 MHz. Like all of the VHF/UHF frequencies, this frequency range serves an enormous variety of agencies and uses. You'll find amateur radio, public service, aeronautical and marine communications, satellites, experimental and testing frequencies, and even television.

Of course, one of the biggest users is the military. *Monitoring Times* is proud to present a comprehensive list of nationwide UHF military assignments in the previously uncharted 225-400 MHz band.

Voz Cristiana21

By Kenneth MacHarg

Voz Cristiana (Christian Voice) is the broadcast outlet sponsored by Christian Vision which targets Latin America in Spanish and Portuguese. The British-based Christian Vision organization bought the site from Radio Nacional de Chile in 1996 and added it to its growing number of shortwave outlets around the world. Unlike many other shortwave broadcasters, Voz Cristiana broadcasts in one language and tries as much as possible to relate to the local audience.



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Reviews:

We have a lot of reviews for our readers this month. Bob Parnass continues his series of open-source software for popular receivers; this month he presents **Tk120** software for the Yaesu VR-120 pocket receiver (p.80).

Two decoder programs from **AirNav** will decipher ACARS messages and SELCAL identification codes to add new depth to your aircraft monitoring (*Computers & Radio*, p.82). *Plane Talk* also looks at the **AirNav 4's** suite of programs, and takes on the challenge of the revamped **ATC Simulator** program (p.68).

The **AOR LA350** is not just an active loop antenna, it's a whole antenna system covering the range from 200 kHz to 30 MHz (p.76). Bob

Grove also reviews the **ZAP Model 180 Electric Field Meter** for testing field strengths in a range from 10 MHz to 4.5 GHz! Plus, he compares two more mobile scanner antennas in a side-by-side with the Nil-Jon Super M: **Everhardt "Tiger"** models MS-1 and MS-CB.

MFJ's 1020C Active Antenna continues to refine their shortwave (3-30 MHz) alternative for folks who can't put up an outside antenna (p.87), reviewed by Ken Reitz.

Summer or winter, weather is a critical part of our lives, but tracking the weather has never been more fun or educational than with the **Davis Instruments Vantage Pro Wireless Weather Station** (*Easy Access*, p.86).

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FCC Announces Changes to Multi-Use Radio Service

MURS: a new VHF 2-meter (150 MHz) Citizens Band Radio Service

"The rules adopted in this Order continue our efforts to consolidate and streamline the Part 90 [Business Radio Service] Rules, allow more efficient use of the spectrum, and provide Part 90 licensees with greater flexibility and clarity concerning their operations. In particular, we affirm the decision to license by rule (i.e., eliminate individual licensing for) five VHF frequencies that were formerly licensed under Part 90 for low-power, industrial/business use, by placing frequencies in a new Part 95 Citizens Band Radio Service named the Multi-Use Radio Service (MURS). In addition, we decline to restrict the use of MURS to Part 90 Industrial/Business Pool eligibles. The general public is licensed by rule to use MURS for communications related to personal or business activities.... (From FCC release.)"

According to the FCC, the *Multi-Use Radio Service* (MURS) is a two-way, short-distance voice or data communications service for personal or business activities of the general public.

On November 13, 2000, the Commission "licensed by rule" – that is, eliminated the individual licensing requirements – for five VHF frequencies that had previously been allocated for low power (1-2 watt) operation in the Part 90 *Business Radio Service*. The five so-called "color dot" frequencies (151.820 MHz, 151.880 MHz, 151.940, 154.570 and 154.600 MHz) were transferred to the *Citizens Band Radio Service* and a new *Multi-Use Radio Service* (MURS) was established under Part 95 (subpart J).

Even though the five MURS frequencies were formerly available only for business communications, the FCC's creation of the MURS made them also available for personal and family communications. Like the UHF *Family Radio Service*, there are no call signs and no station ID is required.

Maximum MURS transmitter power is 2 watts, making MURS (at 150 MHz) four times more powerful than the half watt FRS (at 460 MHz). Emission is narrowband FM (NBFM). The original rules did not prohibit repeater stations, signal boosters (amplifiers) or telephone interconnection.

Unlike FRS, you may connect an external antenna to your MURS radio. Using an antenna mounted on the vehicle's roof and communicating with another similar unit, you should expect to get at least a couple of miles (except in the most harsh conditions), and possibly up to ten miles or more. Another advantage is that MURS communications do not suffer from the long-range "skip"

interference that plagues CB radio at 27 MHz.

Although some radios are available by mail order over the Internet, there are currently no widely available MURS radios, since both Radio Shack and Motorola opposed permitting personal use. Now that the FCC has ruled on the Petitions for Reconsideration, the price of a MURS transceiver should drop to the \$50 range once equipment manufacturers go into mass production. This new personal radio service has the potential to become very popular, especially in the traveling community.

Petitions for Reconsideration

Motorola, the Industrial Telecommunications Association, Inc. (ITA) and Radio Shack objected to the new service. They believe that the Commission should have adopted operational and eligibility rules to ensure that the frequencies are used primarily for business and industrial applications.

The petitioners contend that "...the expanded use of these frequencies by the general public will result in increased congestion and interference that is incompatible with effective business communications." While not said, Motorola and Radio Shack also may have been concerned that MURS transceivers would dilute their sales of FRS radios which are booming.

Motorola and ITA wanted the FCC to cancel the new MURS service and to return the five MURS frequencies to the *Business Radio Service*. Radio Shack requested that the FCC add eligibility restrictions to Part 95 so that only business and industrial users would be licensed by rule to use MURS.

In a *Memorandum Opinion and Order (MO&O)* released May 23rd, the Commission affirmed the decision to "license by rule" and declined to restrict the use of MURS to business-type communications. On their own motion, the FCC also adopted several technical rule changes in order to prevent MURS abuse and degradation of service and "...to streamline and eliminate rules that are no longer warranted." The new rules are effective about July 1st.

Under the revised rules, MURS units are:

- Permitted to have detachable antennas. Antenna height, currently not limited, will be limited to the same standards as for CB Radio at 27 MHz: 20 feet above structure (exclusive of the tower, mast or pole on which it is mounted), or 60 feet above ground (whichever is higher).
- Maximum transmitter power, now limited to two watts ERP (effective radiated power, in-

cluding antenna gain or loss, line and connector loss, etc.) will be determined instead solely by transmitter output power (TPO). The original ERP method was too difficult for the public and consumer-level user to understand and calculate.

- Emission standards (maximum deviation levels), currently restricted to vary narrow limits, will be relaxed (increased) on the two MURS frequencies in the 154 MHz band. This will permit the use on those two specific frequencies of older, NBFM (narrowband FM) radios with a maximum +/- 5 kHz deviation.
- Repeater operations and "signal boosters," currently permitted, will be prohibited. The FCC's intent is to prohibit both real-time repeating, and the time-delay (store and forward) type of repeating.
- Continuous carrier transmissions, currently permitted on four of the five MURS frequencies, will be prohibited on all five frequencies. MURS radios will not be permitted to be used as cordless telephones or radiofacsimile (imaging) devices. Remote control and telemetry use is permitted.
- Interconnection with the public, switched telephone network (PSTN), – that is, phone patches – currently permitted, will be prohibited.
- New certification procedures will be implemented to more distinctly identify what is and what is not a radio model acceptable for use at a MURS station. MURS and FRS may not be integrated into a single radio.

Hobby, business and personal use

Two meters (144 to 148 MHz) is the most widely used frequency band in the Amateur Radio Service. It is used primarily for chatting and socializing with other nearby hams ...usually through a repeater which extends the transmitting range. Unlike the 2 meter ham band, the MURS service is expected to be filled by everyone from hobbyists to commercial users all vying for local communications that is license and virtually regulation free. There is no restriction on the content of communications in the Multi Use Radio Service; commercial as well as personal communications are permitted.

Although restricted to direct communications (that is, no repeaters are allowed) the 2-meter VHF-CB band could become very popular. We predict that users will migrate from 49-MHz, 11-meter CB and FRS, once cheap "bubble-packed" commercial MURS transmitting equipment becomes available at chain stores and word gets around that unlicensed operators have access to five 2-meter frequencies for recreational use.

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Lawrence Magne-Editor in Chief, Passport to World Band Radio.

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Size: 20.5" L x 9" H x 8" W

Weight: 14.50 lbs.



Satellit 800



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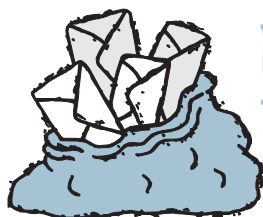
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LETTERS TO THE EDITOR

Misleading Advice?

The following writer enclosed a tear-sheet of Doug Smith's May *American Bandscan* column in which he did a comparison of receivers asking which is best for AM DXing. "I find [the article] to be disingenuous and right of center misleading. The Sony ICF-2010, according to Sony, has been discontinued as of October 1998.

"Here we are four years later and your reviewer Doug Smith is offering a review of a product over ten years old and no longer in production. Not much credibility for *Monitoring Times*."

—Melbourne C. Weir, Bronx, NY

I will agree with the writer that we could have been more careful to specify that the radio is out of production, but one certainly can't say the Sony ICF-2010 isn't readily available. In fact, I'm proud to say I purchased my first '2010 just a few months ago in mint condition and I feel darned lucky to have it. As the longest-running model ever sold, it should be possible to find the '2010 (even on some store shelves) for years to come — and I'd hate to speculate on how many of our readers already own one!

I felt it was clear that Doug was not reviewing these models but they were simply a selection of radios he had already in his possession which were fairly representative of what readers might have in their own home. We always get folks trying to compare the results from a communications-grade receiver to an off-brand discount radio, so this was an interesting exercise of trying to make an objective comparison of extremely dissimilar radios.

What's the Verdict on Shortwave?

"I have to admit I was a bit taken aback by the June editorial, 'Can Shortwave Broadcasting Be Saved?' calling on all hobbyists to save shortwave radio. It caught me off guard, especially in light of the fact that *MT* publisher Bob Grove wrote an editorial in the May issue saying the medium is alive and well. Shortwave programming expert John Figliozzi has also indicated shortwave is doing just fine, thank you. Even more puzzling than the obvious contradictions, the author doesn't give many helpful hints about how to save the medium, other than a recommendation to contact the various radio stations.

"I understand and respect that your magazine has to give both sides of the story, but what is the verdict on this issue, at least as far as *MT* is concerned? It's confusing when I read about a prosperous shortwave medium one month, only to be told it's in jeopardy

the next. There is no consistency."

—Chris Boyd, Rancho Palos Verdes, CA

Yes, the timing of those two editorials produced an irony that I knew wouldn't be lost on our readers. Is shortwave doing okay? *MT* probably has as many opinions on the subject as we have writers, but here's my definitive answer: "yes and no"! There continues to be plenty to listen to on shortwave — in broadcasting and utilities alike — so the medium is still strong. However, who are the major players and the content of their broadcasts is in constant flux.

John Figliozzi also wrote with some background to explain what's behind guest writer Bob Zanotti's point of view:

"Don't be too hard on Bob Zanotti. He, too, is a rabid proponent of shortwave. You may not know this: Bob was a very popular presenter of a legendary program called *The Swiss Shortwave Merry-Go-Round* (sometimes also called *The Two Bobs* in recognition of his partnership with the program's co-host, Bob Thomann) on Swiss Radio International. It was summarily cancelled by SRI at the height of its popularity. More recently he had only been heard infrequently as host of SRI's monthly *Name Game* contest/tourism program.

"Bob has had to suffer (literally) through a decade or more of clueless management at SRI, which first believed satellite was the delivery vehicle of the future and now thinks that the Internet will fill that role. (They turned out to be 180 degrees wrong on the first count and are soon to be two time losers with the second, if you ask me.)

"There is more than a little pent-up frustration in his *MT* piece, to be sure, but he is offering good advice in my estimation. Listeners have been much too passive for their own good. And too many times, listeners write to stations only to obtain trinkets or score QSL cards, rather than to offer intelligent comment on programs — something that plays directly into the hands of the 'new breed' of inexperienced managements that have been seeking to reduce emphasis on shortwave by overhyping the internet and other delivery vehicles.

"In the end, all that Bob is saying is that listeners need to get more actively involved — as listeners, not as hobbyists — if they want to trump what this new breed of so-called experts are purveying, and preserve a secure future for international broadcasting on shortwave. Read the piece again...I agree there are hard words there; but there is also good advice.

—John Figliozzi, *MT SW Program Manager*

FCC Monitoring Post

These pictures were contributed by *Below 500 MHz* columnist Kevin Carey, who says, "I thought you might like to see these pictures of an FCC remote monitoring post located in Canandaigua, NY, about 20 miles southeast of Rochester. Any idea what type of antenna system it uses?"

"I'm told that many years ago, there used to be an 'elephant cage' antenna at this location and that it was staffed with a handful of people. Now it is remotely controlled from Columbia MD."

I don't know if enough detail can be seen, but perhaps some of our readers are familiar with this site.



We welcome your ideas, opinions, corrections, and additions in this column. Please mail to **Letters to the Editor**, PO Box 98, Brasstown, NC 28902, or email mteditor@grove-ent.com. Letters may be edited for length and clarity. Happy monitoring!

—Rachel Baughn, KE4OPD, editor

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Trouble in Paradise?

When Honolulu's digital system was first installed in 1998, police officers complained of outages, lost connections, garbled audio, and a malfunctioning panic button. After two years of complaining, they finally took out ads appealing to the public, urging citizens to let police officers use cellular phones. Administrators quickly agreed to fix the problems, and in spring of 2002 announced completion of the upgrade. The total system cost has moved from the original \$20 million at installation to \$40 million with the addition of repeaters and more radios.

The Hawaii police association was aided in the ad campaign by the Combined Law Enforcement Association of Texas (CLEAT), a group with a long history of taking their grievances directly to the people.

FDNY New Radios

A second attempt to roll out the new Motorola radios intended for the New York City Fire Department should take place late this summer, following extensive testing and the installation of 60 repeater stations on high-rise buildings throughout the city. The system has been much anticipated for its flexibility and interoperability with other agencies. After being introduced early last year, insufficient training and testing as well as other irregularities led to the radios being pulled back in March 2001.

Although the radios are digitally programmed and were intended for digital operation, they apparently will be reset to analog mode so that emergency communications can break into an on-going communication.

We can hope for the best. When company and fire officials are reported as saying that "higher frequencies [are] better able to penetrate concrete and steel than the radios in use on Sept. 11," one has to wonder if the folks buying and selling these new radio systems know what they are talking about!

Listening Post for Sale or Rent

According to the Russian newspaper *Izvestia*, Cuban leader Fidel Castro offered the sprawling Soviet-built electronic intelligence-gathering base near Lourdes, Cuba, to the Chinese government for operations against the United States. Apparently a Chinese military delegation visited the site last autumn and expressed some interest. Now that the Russians have departed, will there be a new occupant?

Radio Hot Potato

The Cuban government may be interested in listening in on the U.S., but they don't want citizens doing the same. The Cuban government is angry about a U.S. program which has placed more than 1,000 radios in the hands of Cubans.

"This is sheer intervention in our internal affairs," said a Cuban government official. "They did that in Eastern Europe, and they think they have a right to do it in Cuba. We won't allow it. This is another proof of the arrogance of the U.S. government."

In embassies around the world, U.S. diplomats distribute literature, video and audio tapes, and sometimes even satellite dishes, to help "build

bridges" with the United States. Vicki Huddleston, the top U.S. diplomat in Cuba, said the radios are simply an extension of that program. She began by giving out 500 radios as party favors at her residence July 4, 2001.

"People in this society want information about what is going on around the world, and they also want entertainment," Huddleston said. "I'm not sure what the Cuban government is so afraid of." Huddleston said the radio giveaway is similar to "robust" efforts by Cuban diplomats in the United States. But a Cuban official said it was completely different.

"Our diplomats meet with your people to try to normalize relations," he said. "We are not trying to undermine your government. We are not trying to change your constitution. We are not trying to subvert internal order. But that's exactly what your people are trying to do here."

"We are trying to influence events here, but peacefully and legally," a recipient of one of the radios said. "That's why the government is afraid of a few radios."

BULLETIN BOARD

August 3: Huntington Beach, CA

The American Shortwave Listeners Club monthly meeting, 12 noon at 16182 Ballard Lane. More information via 714-846-1685 or wdx6aa@earthlink.net.

August 10: Longview, WA

Lower Columbia A.R.A. 11th Annual Ham Radio, Computer, & Electronic Equipment Swap Meet at Cowlitz Co. Expo Center, 9 a.m.-1 p.m. Adm \$5. Talk-in on 147.26+, pl 114.8. LCARA, POB 906, Longview, WA, 98632. Bob Morehouse, KB7ADO, (360) 425-6076 eves, KB7ADO@aol.com; <http://www.qsl.net/n7p/>

August 11: Westminster, MD

Carroll County ARC Tailgate Fest, at the Carroll County Ag Center. Rain Date August 18. Talk-in on 145.410 MHz. Contact Steve Beckman N3SB, CCARC, PO Box 2211, Westminster MD 21158 or via email: n3sb@arrl.net. Further information available at <http://www.qis.net/~k3pzy/tailgate.htm>

August 15-18: Pori, Finland

European DX Council convention (followed by separate tour to Tallinn, Estonia, and Estonian Radio) Location: Pori, Finland, Spa Hotel Ytteri. Tour of YLE SW transmitter, panels and sessions on AM/FM DXing and SW DXing, contests, entertainment. Registration 65 Euros (1 Euro is about 0.88 USD). Camping also available. For information visit <http://www.sdxl.org/edxc/edxc2002.html> or email edxc2002.sdxl.org

August 16-18: Seattle WA

2002 International Radio Club of America convention at Towne and Country Suites (1-800-545-2323 for reservation or visit <http://www.towneandcountrysuites.com>). For information on the conference check <http://www.geocities.com/Heartland/5792/>, or Phil Bytheway, 9705 Mary Ave NW, Seattle WA 98117-2334 phil_tekno@yahoo.com. Registration \$30 to Phil Bytheway.

August 16-18: Escondido, California

Southwestern Division of the ARRL 2002 Convention. The main theme for the convention is "mentoring." E-mail KF6NXQ@home.com, or write PO Box 211861, Chula Vista, CA 91921-1861.

Hobbyist Discloses Surveillance Pictures

John Locker, former columnist for Grove's now-defunct *Satellite Times* magazine, finally got someone to listen to him. He's been trying to warn NATO that surveillance pictures from spy planes over the Balkans can (or could) be watched by anyone with basic equipment.

Locker said he stumbled across the images, which were beamed over an unsecure satellite link and were not encrypted, while watching television using a satellite dish in November.

The Pentagon, however, said the images were not classified and, therefore, were not considered intelligence information. Classified video is sent over the military's secure communications network, Pentagon spokeswoman Cheryl Irwin said.

Watch *Monitoring Times* this fall for the fascinating story of what John Locker found and why he finally had to resort to the media before someone would listen to him. At press time the pictures are still viewable. Locker told *MT*, "I am still hoping that someone over in the US will take

August 17: Seal Beach, CA

Southern California Area DXers (S.C.A.D.S.) Annual Picnic at the Huntington Central Park in Huntington Beach from 8am to 5pm. Set-up time is 7am. Bring your portable receivers, antennas and your log books. Also bring your cold colas and picnic stuff to eat and share. Check the SCADS website for updates - <http://www.ocnow.com/community/groups/radiocommunications>.

August 17: Madison WI

The 9th annual Madison Get-together for DXers and Radio Enthusiasts begins at 1 p.m. Hosts Bill and Nina Dvorak, 501 Algoma Street Madison WI 53704-4812, telephone 608-244-5497. An all-band event for DXers. For more information, e-mail Bill at dxerak@aol.com or by the above address or phone number.

August 17-18: Huntsville, AL

The Huntsville Hamfest at the Von Braun Center, 700 Monroe St., 9am both days, Adm \$6; .Talk-in: 146.94 K4BFT. All activities are indoors! Amateur License exams will be held both days at 10:00 a.m. National Young Ham of the Year (YHOTY) award presentation, forums, giant dealer/manufacture show, huge flea Market, DX banquet, and door prizes. Friday & Saturday night Hospitality rooms at the nearby Huntsville Hilton. Call Huntsville Hilton for special Hamfest Rates (256) 533-1400. General Info (256) 880-8004 or visit <http://www.hamfest.org>

August 25: Lapeer, MI

Lapeer County ARA Hamfest & Computer Show at the Lapeer County Center Building, 245 County Center Drive, Lapeer, MI 48446 (Approx. 15 minutes east of Flint, MI. Exit 155 off of I-69), 8am to 1pm; Admission is \$5.00. Contact: Ken @ 810-245-3907, fax 810-245-0366 or email: w8lap@arrl.net. Details, map and flyer on our website: <http://www.w8lap.com>.

August 30-Sept 2: NRC Convention

National Radio Club convention at Hampton Inn, Lima, Ohio (1933 Roschman Avenue, off the intersection of I-75 and SR117/309; phone 419-225-8300); host Fred Vobbe. Registration \$40 (\$20 spouse) includes evening meal, banquet, and continental breakfasts. Go to <http://www.nrcdxs.org> for details.

a common sense approach and encrypt, which is my ultimate aim, so that this stuff disappears from view."

FEMA to Iron Out Interoperability

The knotty task of solving the emergency communication interoperability problem is being assigned to the Federal Emergency Management Agency because of its emphasis on emergency preparedness and first responders. FEMA will organize the government's communications capabilities under Project SafeCom to ensure emergency workers are outfitted with interoperable equipment.

FEMA plans to use bridging technologies to improve the situation in the near future as it moves toward creating a national standard. Ronald Miller, FEMA's chief information officer, said, "Technology is not the problem," he said. "Our job is to bring this community together to find a coordinated solution."

At the heart of the issue was the breakdown in communications following Sept. 11; because of reduced phone service and incompatible radio systems, some agencies were reduced to using runners to communicate with handwritten notes.

In Miller's mind, a reserved radio spectrum for safety is the answer to the communications problem, and the agency hopes to establish equipment standards by the end of the year. Meanwhile, 75 percent of \$7 million in grants to states is to go to local governments to enhance secure communications systems with video, voice, and data capabilities.

Talk Through the Hub

While agencies from all levels of government spend millions of dollars to find the perfect radio that will meet everyone's requirements and fit every conceivable situation, one solution being tested in South Florida is the JPS ACU-1000 – an interconnecting component providing "Direct communications between local, state and federal agencies at the scene of an incident, regardless of radio frequency, type, make, or model..." (JPS advertisement) All it requires to work is one radio from each participating agency.

"Rather than continuing to operate apart, 'we set up three hubs,' said the Miami Dade Police Department's Capt. Jesse Varnell. 'One handles local government; the second handles state agencies, and the third supports federal users like the INS, the U.S. Customs service, and U.S. Coast Guard and the Border Patrol.' Through these hubs, everyone can talk to one another. 'We can also patch an FBI officer through the Border Patrol's hub directly to a MDPD tactical unit, and back again with no problems.'

PSWN has supplied Dade, Broward and Monroe Counties with a TRP-1000, the transportable version of JPS Communications' ACU-1000 radio switch. 'If we're faced with a mass immigration coming in from the sea, we can drive the TRP-1000 to the scene and plug in our various radios,' said Varnell. 'This way, we can all communicate with each other.'" (*Mobile Radio Technology* magazine)

Lightning Disables Radios in D.C.

Adding insult to injury (see last month's

DC Fire Dept Woes), D.C. firefighters were forced to use cellular telephones to handle emergencies for more than 10 hours June 19 after lightning knocked out their radio system.

A lightning strike at the public-safety communications center on McMillan Drive NW knocked out two of the four antennas that relay messages over the Fire and Emergency Medical Services Department's 800-megahertz digital-radio system.

"It's an inferior system," fire department spokesman Alan Etter said of the department's radio system. "It's a system that was optimized for 19 antenna sites, and we've got four."

Despite having an inoperative radio system, firefighters handled a bomb scare at the Federal Reserve, massive traffic tie-ups and other fire and medical emergencies. Battalion Chief Stephen Reid said the radio system's failure "tested our mettle." The Metropolitan Police Department's analog radio system was unaffected.

D.C. Chief Technology Officer Suzanne Peck said her office is exploring ways to back up its equipment but also must consider how rare a lightning strike is before committing funds.

Florida Man convicted

A Florida Citizens Band enthusiast accused of jamming Amateur Radio operations and transmitting without a license was convicted in federal court June 19 on eight misdemeanor counts. William Flippo of Jupiter was found guilty of four counts of operating without a license and four counts of deliberate and malicious interference. Federal District Court Judge Daniel T.K. Hurley noted that, while the charges were misdemeanors, it was important that the amateur airwaves be free of interference in the event of an emergency. He ordered that Flippo remain in custody and undergo a psychiatric evaluation prior to sentencing.

According to Ed Petzolt, K1LNC, who testified in the trial, Flippo primarily had targeted the Jupiter Tequesta Repeater Group for jamming and regularly interfered with amateur operations, especially on 10 and 2 meters, over an approximately three-year period. Following up on amateurs' complaints, personnel from the FCC's Tampa District Office visited the Jupiter area at least twice in 1999 and reported tracking the offending signals to Flippo's residence.

Sentencing could take place in about a month. According to the FCC, Flippo faces a maximum penalty of eight years in prison – one year on each count. He also faces up to \$80,000 in fines. (ARRL)

Communications is compiled by editor Rachel Baughn KE4OPD from newspaper clippings contributed by our readers. Many thanks to the following reporters for news received this month by mail: Anonymous, Albany, NY; E. Hochstatter, Colfax, WA; Ira Paul, Royal Oak, MI; Doug Robertson, Oxnard, CA; Brian Rogers, Melvindale, MI; Richard Sklar, Seattle, WA. And by email: Mary Anne Kehoe, Rick Kissell, John Mayson, Fred Moore, Ken Reitz, Doug Smith, John Stanko, Larry Van Horn, Robert Wyman.

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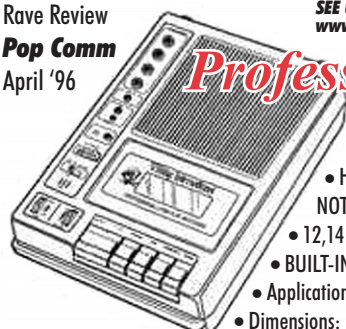
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Scanning In Paradise

BY GEORGE FURUKAWA



Photo credit: Ron Hashiro

HONOLULU, HAWAII: On any given day, even in this tropical paradise of billowing clouds and balmy tradewinds, radio buffs can scan virtually everything – air traffic at Honolulu International Airport, EMS personnel frantically responding to 9-1-1 calls, firefighters converging at a raging seven-alarm fire, HAZMAT crews negotiating congested downtown Honolulu streets in response to a possible anthrax attack, or the U.S. Coast Guard responding to maritime distress calls like the tragic sinking of the *Ehime Maru* off the coast of Oahu.

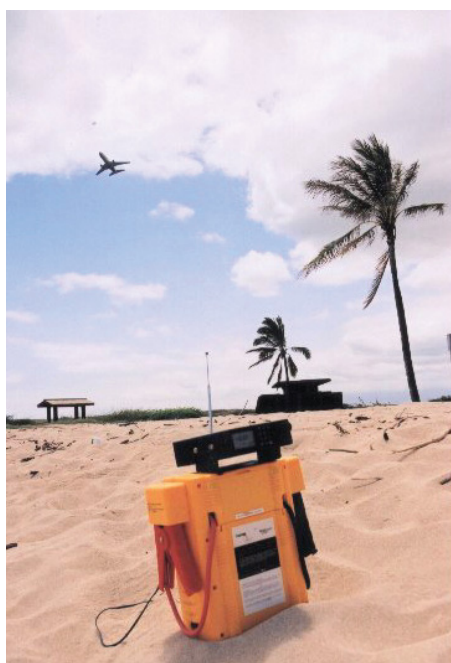
Hawaii has no state restrictions on scanning, so whether you're a resident of the State of Hawaii or just passing through, bring your scanner along and see another side of life on the islands.

Scanning the Skies

Ron Hashiro, a veteran ham operator (AH6RH) and freelance photographer who lives in Honolulu, suggests packing a picnic meal (in Hawaii, a plate lunch and a soft drink), and heading out to Magic Island, a shoreline park just west of Waikiki Beach. From here you can watch aircraft arrive and depart, while monitoring aircraft and control tower frequencies at Honolulu International Airport. "It's easy to listen to the outbound traffic on 118.3 MHz, and it's a joy watching the planes do a graceful take off from runways four or eight, climb into the sky, and pass in front of you on the way to the mainland or neighbor islands," Hashiro says.

For the arriving jets that are flying overhead

or far offshore, it's easy to see them against the light blue sky, or see the landing lights at night, according to Hashiro. The aircraft call on 118.3 MHz, and when aircraft are on final approach, crews switch to the tower frequency of 118.1



Aircraft flying over Sand Island in Honolulu - Photo by Ron Hashiro

MHz. During days when typical northeast tradewinds subside, winds come from the south. The outgoing and incoming patterns are switched, as aircraft land in the opposite direction. Under these conditions, ham operators can see aircraft literally pass in front of them, with flaps and landing gear down. For a better view, Hashiro recommends Kakaako Waterfront Park, west of Magic Island and Ala Moana Beach Park. On final approach, aircraft literally pass in front of you, within a half-mile of the shoreline.

Since September 11, 2001, Hashiro notes, there's been a TFR (Temporary Flight Restriction) that changed the landing patterns. Before the U.S. terrorist attack, aircraft landed on Runway 8L, which on the final approach took flights over the channel entrance of Pearl Harbor and Hickam Air Force Base, with scenic views of Pearl Harbor. Now, approaching aircraft must stay east of the Honolulu International Airport control tower, which means landing on Runways 4L and 4R. From Waikiki and Ala Moana, aviation buffs should be able to see aircraft on final approach line up over the ocean, and execute a smooth landing.

The Hawaii Air National Guard protects Honolulu International Airport, as well as the state of Hawaii, from the air. The National Guard flies the McDonnell Douglas F-15s. The F-15s are one of the few aircraft in the world with a thrust-to-weight ratio greater than one, which means the fighters can accelerate straight up. The squadron often departs in the mid-morning and mid-after-

noon for daily flight training. Honolulu International Airport is a Class B airport, and air traffic control has jurisdiction for flights in the airport area below 9,000 feet. "If you're lucky, you might see the F-15s depart in special fashion, known as the HANG-10 departure," Hashiro says.

"Sometimes, the National Guard gets underway by rolling down reef runway 8R with afterburners on full," he explains. "Before the plane reaches the end of the runway, the pilot will lift the plane off the ground, raise the wheels, pull the plane back into a straight vertical climb, and apply full afterburners. The plane will accelerate straight up, to 300 miles per hour (which sounds and looks like a rocket), taking only a minute to break the 10,000-foot barrier. At that point, the pilot levels out and goes anywhere he chooses."

On occasion, scanner listeners can hear special aircraft transiting through the area, according to Hashiro. When the Concord came to Honolulu for the first time, the Air France jet had a callsign of "Air France Speedbird Heavy." Listening to ground control and the Honolulu International Airport tower, Hashiro could tell when the plane was in position to take off. That roar of the engines was the loudest he had heard at the airport, much louder than the F-15s and KC-135s. As soon as the plane hit V2 (which is the speed at which the aircraft goes airborne), Hashiro recalls, the thrust of the engines brute-forced the plane off the ground.

The pilot turned over the ocean, and did his version of the HANG-10 departure, except that he did it at an incline. Instead of the slow, graceful departure one usually sees with jumbo jets, the pilot pointed the aircraft south, and proceeded at incredible departure speeds (more than 300 miles per hour). In two minutes, the Concord was a speck, heading towards Guam at a flight level of 55,000 feet.

Other special air traffic that can be heard includes pilots on holding pattern, due to the arrival or departure of Air Force One. When the president of the U.S. arrives and departs from Honolulu, normal landings and departures are suspended. Hobbyists can hear traffic between the Honolulu International Airport tower, and pilots discussing status updates for clearances. Scanning such communications provides a fix on when Air Force One will be airborne.

On HF air band, Hashiro notes, listeners can hear inbound and outbound flights transiting between Hawaii and other destinations on HF (High Frequency shortwave). Hashiro often tuned



Honolulu Fire Department performs an air rescue - Photo by David Cabatu.

his ham radio into the general coverage bands, and could easily hear aircraft at night on 5547 and 5574 kHz, providing position and other reports with Oakland Center.

Hashiro uses a Radio Shack PRO-2032 desktop scanner, with a range from 30 MHz through 800 MHz bands. He also uses an Icom R-100 communications receiver, which covers AM broadcast through 1.8 gigahertz. Hashiro's favorite listening radio, while it's not a scanner, is a Yaesu FT-817, which is portable and covers all modes, AM broadcast through 450 MHz, enabling HF and aircraft scanning.

Veteran Honolulu ham operator David Cabatu (AH7E) scans inbound and outbound flights on the VHF high band system at 118 MHz, and all the way up to 136 MHz. Cabatu enjoys scanning aircraft communications, such as when aircraft cross the shore of Molokai and make their turn towards Honolulu.

Public Safety Radio Systems by County

Honolulu County -

Ericsson EDACS (Analog)/Pro-Voice (Digital). Dual analog-digital is used by police and federal agencies. Civil Defense, Ocean Safety and Transit use analog. The Honolulu Fire Department is slated to move to 800 MHz sometime in 2003. EMS uses a four-channel UHF radio system.

Hickam Air Force Base uses a 400 MHz Motorola Type II Trunked Radio System, and Hickam Crash-Rescue is linked to a VHF single channel system.

Honolulu Airport (sheriffs/fire/ambulance/maintenance) uses an 800 MHz Motorola Type II TRS, with five frequencies. Honolulu sheriffs use conventional UHF in the 453 MHz range.

Maui County -

EF Johnson Multinet II is used by police, fire, Civil Defense and a few other agencies on Maui, Molokai, and Lanai. The system can be monitored, but there isn't a scanner that

can follow a transmission from a single agency. EMS should have monitoring capability, but continues to use a single channel UHF radio system.

Hawaii County -

The police use a 10-channel VHF conventional radio system, which is repeater and simplex operation capable. Hilo district patrol uses simplex, while North Hilo is on via repeater. Frequencies are shared between multiple districts in varying parts of the Island, but transmissions are never stepped on.

District 2 North Hilo uses 155.415, and all North Hilo transmissions can be heard while in the district. District 6 Kona also uses 155.415, but only Kona transmissions can be heard while in the Kona district.

EMS calls are dispatched by county fire - and these are the only two county agencies that are interoperable - as fire dispatches both medics and fire units simultaneously. When medic units need to communicate with a hospital, they switch to a dedicated UHF frequency with superb islandwide coverage specifically for medic to hospital communications.

Kauai County -

The police, fire/lifeguards/road maintenance/transit/public works use a Motorola Smartnet Trunked Radio System (Type II). EMS uses a conventional Motorola UHF radio system.

Medicomm

The ambulances on Oahu are coordinated by the State Department of Health communications system known as Medicomm, according to Hashiro. Ambulance personnel use VHF walkies to communicate with ambulances, which have UHF cross-band repeaters. The system is a collection of UHF repeaters and microwave links. Dispatch occurs on 453.700, and much of the medical traffic occurs on 453.925.

"Last night was hectic," Cabatu says. "There



Maui Fire Department vehicles - Photo by Ryan Yamamoto.



Honolulu FD air rescue personnel - Photo by David Cabatu.



were two structure fire calls and in one of the incidents in Hawaii Kai (Honolulu), someone was injured when they were evacuating the building. EMS was called to the scene and I think it will be in this evening's news.

"Having a scanner in my car has been helpful, because I've been able to avoid major traffic congestion, for example. While I'm in my car, most of the time, I scan police communications. However, since the police have gone digital, there's not as much reason for me to carry a scanner in the car. Most of the communications is EMS and fire related. It's rare that I can scan police communications. When I'm able to scan the police, it's usually on weekends, and it usually relates to traffic enforcement units.

"I got a feel of how reporters were presenting the news on television. They just pick up information on scanners, so after awhile, I just stopped watching television news. All the day's news is on my scanner."

Hashiro says scanner listeners can hear a variety of activities around town unrelated to fires. Typical callouts include co-response with ambulances, and washing down of gasoline after traffic accidents. What makes for fascinating monitoring, Hashiro notes, is when there's a substantial, multi-vehicle accident on the main freeway that cuts through metropolitan Honolulu. One can hear near simultaneous dispatching of police, fire and medical responders. As the situation evolves, the listener is able to determine when wounded individuals are extracted from vehicles and transported to hospital emergency rooms specializing in traumas.

Police Department

"Public safety scanning in Hawaii is fairly good," Cabatu says. "With the unfortunate demise of the analog police communications in Honolulu, ham operators [and others - ed.] can still monitor police communications on the Big Island of Hawaii on VHF. On the island of Maui, they have somewhat of a difficult trunk system to monitor. They have a pool of shared frequencies the government agencies use. At times when I've monitored the system, there's always one dedi-

cated frequency used for police communications, or civil defense communications."

However, Cabatu cautions, if multiple users access the system at the same time, hobbyists scanning an ongoing police communications channel might suddenly experience a switch of frequencies. It would be difficult to scan if police, fire and multiple government agencies use the system. When Cabatu went to Kauai, the reception was "excellent to superior," as far as monitoring. The reception was good from the west side of



Honolulu Police Department , Battalion 2 - Photo by David Cabatu.

Kauai, down to Hanapepe.

Hashiro doesn't monitor the Honolulu Police Department. Since HPD switched to trunked radios (and he needed to buy a trunked scanner), Hashiro hasn't listened to HPD communications. HPD's detectives have switched to 800 MHz digital.

Fire Department

The Honolulu Fire Department is on a VHF FM analog system until radio communications are transitioned to the new Ericsson 800 MHz analog/digital trunking system. Scanner buffs can hear stations dispatched on 154.22 and 154.28 MHz for metropolitan Honolulu, and 154.33 MHz for the outlying rural areas.

"The Fire Communication Center in Honolulu will be transitioning to 800 MHz sometime during the summer of 2003," Cabatu says. "For now, they're using their VHF radio system which they've had for the last 30 years. I suppose they'll be using analog to cut the cost of maintaining the system. My primary interest is in police and fire communications.

"Back in April 2000 or 2001, there was a seven-alarm structure fire at the First Interstate Building in Honolulu. I had to work on that day and I brought

my scanner with me, so I was able to scan communications relating to that fire. I can't describe the feeling when I heard those tones going out and fire companies being dispatched. I grew concerned when they started sending out third and fourth alarms. I was shocked when they went to a fifth alarm. Fire companies responded as far as Makakilo (west Oahu), Kailua (windward Oahu) and Olomana (windward Oahu)."

Cabatu dabbles in freelance photography, as he scans frequencies. There has been an increase in 9-1-1 calls to rescue stranded hikers on Diamond Head. When the fire department is summoned there, Cabatu has been on the scene taking photos and scanning communications, because he lives relatively close to Diamond Head. He uses a Uniden BC780XLT, 500 channels, capable of scanning conventional or trunked radio systems; a Uniden BC248CLT, 50 channels, with conventional only scanning; a Radio Shack Pro-92, 500 channels, with conventional and trunk scanning capability; and a Radio Shack Pro-2015, 200 channels, capable of conventional scanning only.

Propagation

Cabatu notes that weather conditions in Hawaii play a part in reception, especially when scanning communications on other islands, particularly Maui. For example, on the Big Island, he can't scan anything, unless public safety communications goes on statewide frequency - which is rare. Ideally, Cabatu says, hobbyists should experience good reception when the skies are overcast. The clouds trap radio signals and keep signals close to the horizon. The clouds help propagate signals from, say, Maui to Honolulu. On Kauai, operators should be able to scan Honolulu EMS communications as well.

A good location, conducive weather, and good frequency information should provide fruitful scanning. The higher the elevation, the better the reception. For VHF and UHF communications, cloudy days are ideal for ham contacts. When the skies are a bit cloudy, Cabatu is able to reach the neighbor islands directly on VHF. Most of the time, reception is good. However, there are times when nothing helps.

"I left my amateur radio turned on September 10, 2001, and it woke me up on September 11," Cabatu recalls. "I heard two ham operators communicating, and they were discussing the horrifying images on television. I immediately turned all my radios on and tuned in to EMS. In Hawaii, they had additional EMS personnel available if needed. The Honolulu Police Department had extra security around



Photo credit for this shot as well as the above airplane: Ron Hashiro



Honolulu Police Department, Kapahulu - Photo by David Cabatu.

would-be terrorist targets here. The radio traffic here was moderate on that day.

"Most of the HAZMAT responses here occurred when the first anthrax incidents were reported around the country. There was one anthrax scare in downtown Honolulu that turned out to be false positive.

"I was able to scan the tail end of the U.S. Coast Guard's communications when the *Ehime Maru* sank off the coast of Oahu. I was out at Diamond Head when it happened, but I didn't have my radio tuned to the Coast Guard. That was the first time I scanned the Coast Guard UHF frequencies on the 300 MHz band."

Over the years, Cabatu has scanned communications relating to events that made local, national and international news. The primary agency he

listens to for boaters in distress is the Honolulu Fire Department. The secondary agency Cabatu scans is the Ocean Safety Division of the City & County of Honolulu.

Fishing

Surrounded by the Pacific Ocean, radio hobbyists in the Islands are able to scan communications on fishing boats, according to Hashiro. Channel 23 AM Citizens Band is the main calling channel for the "weekend warrior" fishing fleet. On the Waianae Coast of Oahu, listeners will note increased activity on Saturdays and Sundays - especially during the summer - of recreational fishing crews hooking up to prized fishes such as marlin, ahi (yellowfin tuna), ono (wahoo) and mahimahi. Moreover, Hashiro says, it's more fun to scan if several people go out on boats to expand the fishing expedition - it's a large ocean.

Space Communications

In the past, it was possible to hear ham astronauts aboard the Space Shuttle talking to ham operators in Hawaii on 144.95, according to Hashiro. However, with the change of focus in manned operations from the Space Shuttle to the International Space Station, the SAREX package (space ham radio station), is no longer manifested on the Space Shuttle. Instead, NASA has slowly been building the permanent ham station on the ISS. Hashiro was unable to establish two-way contact with the space station, but his attempt

earned him a QSL card with the shuttle.

There have been several contacts between schools and the ISS when it transits over Hawaii, according to Hashiro. Hawaii is ideal for ISS contacts, because in the middle of the ocean, there are few people with equipment to contact the ISS, which makes it easier to keep a radio schedule with them. On the Mainland, with thousands of ham operators calling, it becomes congested and difficult to keep a consistent series of contacts. Sacred Heart Academy in Honolulu operates a ham radio ground station that's the primary contact for ISS-school teleconferences over ham radio. There is an automated "robot" station onboard the ISS, and it's possible to establish connection when the ISS is overhead.

You can find more information on scanning and scanning frequencies in Hawaii at the following sites:

<http://home1.gte.net/rhashiro/am-radio-in-hawaii.htm>

<http://www.qsl.net/ah7e/county.htm>

<http://www.trunkscanner.com/states/hi.html>

<http://www.interpac.net/~biarc/>

<http://www.karc.net/>

About the author:

George Furukawa is a freelance journalist based in Hawaii with 25 years of experience. His articles have appeared in local, national and international media.

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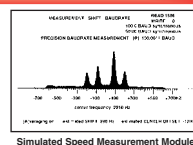
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Having Fun with GPS

By Anton Ninno, N2RUD, and Jim Kuhl, N2STK

Almost everyone has heard of the Global Positioning System by now, and many radio hobbyists own a handheld GPS receiver. For the uninitiated, the GPS system works with a network of 24 satellites orbiting some 12,500 miles up in the sky. Each one has an atomic clock to set the precise timing that is part of the math used by a land-based GPS receiver to triangulate its location on the face of the earth. GPS satellites continuously transmit signals and data. Those signals are picked up by GPS receivers, with up to 12 satellites being received simultaneously.

A calculator in the GPS receiver crunches the data, and shows it to us as latitude and longitude. The GPS term for a set of latitude and longitude coordinates is *waypoint*. If you connect the waypoint dots, you have what's called a *route*. As you move with a GPS in your hand, it generates a virtual breadcrumb trail called a *track*. Waypoints, routes and tracks can be saved in a GPS memory. Now you have the basic GPS vocabulary.

There are many websites that will tell you how GPS works, like "How Stuff Works," but the best site for new GPS users is The GPS Information Site at <http://www.joe.mehaffey.com>. The owners, Joe Mehaffey and Jack Yeazel, are ham radio operators who provide expert reviews of GPS products and useful GPS links. They make it clear that people who love radios can

have fun with GPS receivers, too.

Got a Map in Your Hand?

When people want to know how much to spend on a GPS receiver, we ask if they want to see a map in their hand. Entry-level GPS receivers display basic geographic information: latitude, longitude, elevation, direction, and bearing. They calculate the distance between points and estimate your arrival time. They will also have a screen that shows a graphic representation of the points you marked with the GPS, as if you had drawn a sketch, but that isn't a scale map. For that, you have to spend more, and most GPS users think it's worth the expense.

Better quality GPS receivers come with a base map of North America, but with such a large area to cover, the maps don't include much detail. Spend a little more, and you get map memory, up to 24mb, to upload more maps and a higher level of detail: city maps, topographic maps, and "points of interest" such as hotels, restaurants, museums, and so on. Garmin and Magellan, perhaps the most popular makers of handheld GPS units, produce software for this purpose.

Although you will see maps on your PC screen during the process of uploading them to your GPS, they aren't meant to compete with real desktop mapping software.

Got a Map on Your PC?

Desktop mapping programs, like those from Delorme, Inc., are designed to provide high-quality maps to display on a PC monitor. These applications allow you to build custom maps with your own labels and save them

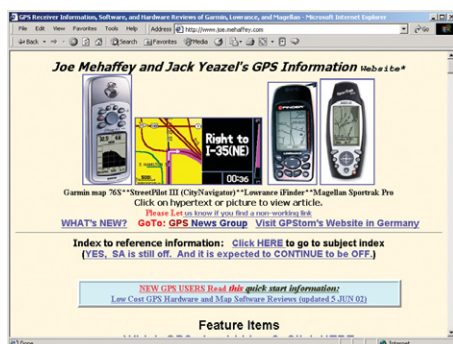
as files. You can print them, too, if you don't mind burning up paper and ink.

With the boom in GPS sales, some map programs now include a GPS menu. The GPS functions in map software include downloading waypoints, routes, and tracks from your GPS to the map software, and uploading those items to your GPS. How many of those functions are available will depend on the specific GPS and map software you own. Two popular map software producers are Delorme and MapTech.

Be aware that you will need to check the specific GPS receiver and map software for compatibility. As new GPS models appear on the market, as the system software on GPS receivers is upgraded, and as map software is upgraded, some incompatibility will occur. Class, close your books! Let's go outside and play!

Degree Confluence Project

Like to travel and take pictures? Enjoy visiting places that are well off the beaten track? Drive a 4WD vehicle? Then get ready for an



Anton Ninno documents a GPS adventure on the Historic Forts web page



exciting geographical adventure! The Degree Confluence Project <http://www.confluence.org> is a delightful way to combine all the latest technology: a GPS, a digital camera, and access to the Internet for some serious fun! By serious, we mean that aside from having fun, you will be contributing to a remarkable set of data for geography education.

All over the world, people just like you are using a GPS receiver to become explorers. The object is to navigate to a point where latitude and longitude intersect as integers, meaning without fractions. We visited the confluence at 43N, 76W, and you can see the report listed under New York State. At this site, you can explore the whole planet, or visit your own neck of the woods. In all, there are more than 12,000 confluences to document, so there's plenty of opportunity get involved. Even if you don't participate, go see the beautiful photos being contributed by intrepid confluence hunters worldwide.

Geocaching: the GPS Treasure Hunt

When the Clinton Administration turned off "selective availability" (the random error factor built into GPS data by the military to prevent our enemies from using the system against us), back on May 2, 2000, the accuracy of GPS receivers was increased from 100 feet to about 20 feet. The next day Dave Ullmer created a new scavenger hunt game for GPS owners. He hid a box in the woods, posted the coordinates on the Satellite Navigation newsgroup, and challenged readers to find it. Within months the game was christened Geocaching by other players, and a website sprang up at <http://www.geocaching.com>.

Geocaching has been spreading like wildfire. New geocache categories being created by enthu-



The confluence of 49N22E was found in the Slovak Republic by Hans Augdoppler and Klaus Baumgartner.

siastic players keep the game fresh. Several alternative sites, like Navicache <http://www.navicache.com> have appeared, and Buxley's Geocaching Waypoint <http://www.brillig.com/geocaching> offers players clickable geocaching maps. The GPS giant, Garmin, Inc. is introducing GPS owners to the game, and has even added an icon to their operating system for geocaching waypoints.

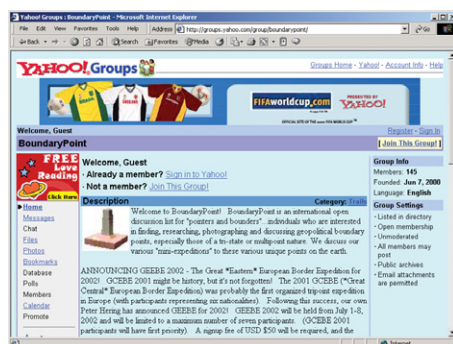


The Further Adventures of GPS

Think geocaching needs more spice? Like to compete in sports? Then Geodashing <http://www.geodashing.home.attbi.com> may be your game. The entire planet is your playing field. The dashpoints you will be challenged to find are much like the control points in orienteering, except they are selected at random. Get the most dashpoints, and you win. The trick will be to find all of them!

If you need an adrenalin rush to get motivated, you can go all-out playing Minute War <http://www.seaotters.net/~scout/MinuteWar>, another form of global competition. Here, players compete at the same time, no matter where they live, using their own local maps. All the maps have been combined for the big game. Each map square is one square minute of latitude and longitude, and it contains a virtual flag. Players use a GPS to visit the exact spots required to capture flags and control the squares. Confused? Visit the site to read the rules and see for yourself – it's incredible!

Or maybe your interest is closer to geography than sporting events. You might find a Boundary Point <http://www.groups.yahoo.com/group/BoundaryPoint> expedition to be closer to your speed. In a more relaxed manner, "pointers and boundaries" visit spots where geopolitical boundaries meet. Think of the "Four Corners" point between Utah, Wyoming, Arizona, and New Mexico. Tri-state and other multipoint locations are your targets. Just like your confluence hunting cousins, you will take photographs and record your adventures to share on the Net. It's no coin-

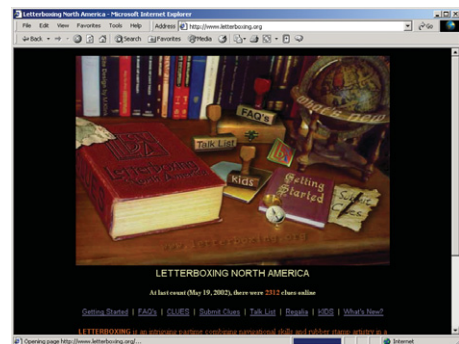


A boundary point on the US/Mexico border across from Tijuana (photographer unknown)

cidence that many recreational GPS websites are linked to each other!

Having fun without a GPS

We cannot tell a lie. Yes, you can have fun without a GPS. In fact, there's group of people who do just that playing a game called Letterboxing at <http://www.letterboxing.org>. Just imagine



geocaching with no GPS. Instead, players use only clues, compass directions, pacing by foot, and sheer brainpower to find letterboxes. If you're English, you know that's the common English

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Anton's GPS documents his visit to 43N 76W.

word for a mailbox. The game began with a guide who left his calling card on the Dartmoor Heath in 1854. (It was a dark and stormy night!) Letterboxing has become a national pastime in the UK. In April 1998, an article in Smithsonian magazine brought it to America. It's good fun for the low-tech fellow who enjoys the thrill of the hunt, the challenge of a three-pipe problem, and a long walk in the woods. Have compass. Will travel.

Outdoorsmen who enjoy photography will find that hitting trails for a little geo-graphing <http://groups.yahoo.com/group/geographing/> will put a new spin on their old habit of shooting up rolls of film when faced with a spectacular landscape. We take pictures to re-experience the joy of those occasions and to share it with others. The same fellow who started geocaching, Dave Ullmer, came up with this new concept: add GPS coordinates to your photographs! If you take a 360-degree photography, you'll really nail down the experience of being in that particular spot. Then you can share it with the group at Dave's website, if you like. The waypoint will help you find the spot again, if once was not enough.

GPS Goes to School

Get ready for a pop quiz. What looks like a GameBoy, is fun to use, and gets you off the couch and out into the world? Right – a GPS receiver! Can you think of a better way to teach geography? We can't either. GPS is being used from 5th grade up to investigate topics in math, science, and social studies. Jim and I are teachers who have been borrowing this multi-billion dollar instructional tool for homework assignments for several years. It's a good thing the GPS system hasn't been charged to our school budgets!

Actually, when you compare the cost of a basic GPS at \$100 to the cost of a computer, GPS is a cheap deal. Students pay almost \$100 for a graphing calculator that doesn't even receive any radio signals, let alone signals from satellites. Why not volunteer to take a GPS to your neighborhood school and demonstrate its amazing powers to

kids? You'll be a hit in any classroom. We're living proof!

While you ponder that possibility, help us spread the word to educators by passing along our NYGPS website. It's a mailing list for teachers who are exploring the use of GPS in school. They will also find a treasure chest of resources there, including activities, books, lesson plans, bookmarks, and photographs. They're all free. Here's an example of a virtual geocache for history teachers, called Historic Forts: http://www.geocaching.com/seek/cache_details.asp?ID=21378. Geocachers from all over are contributing GPS coordinates, photos, and stories about all kinds of forts. A player in Sweden shares a fort called Kastellet in his log report.

Having Fun Yet?

Try these GPS activities. Archaeologists use GPS to mark dig sites and the locations of artifacts. Genealogists use it to mark gravesites and abandoned cemeteries. Historians use GPS to mark the movements of armies on battlefields. There are all the common uses for GPS like hiking, hunting,

fishing, boating, cross-country skiing, cycling, and mountain biking. Spelunkers use a GPS to mark cave entrances and share them with friends. If you've ever looked for a cave using directions from a looney caver, you'll appreciate having GPS coordinates that guide you right to the spot. The same goes for crazy rock climbers.

Take a GPS and a laptop computer with map software on your next business trip or family vacation. It's not only fun, it'll save you time and money as you plan your route for the best possible outcome. Make lots of waypoints, and send them to friends and family by email as you go. They can plot your waypoints with their own map software, and see exactly where you are on every leg of the journey.

Most people like funky old diners. Are we right? Well, here's a little gift for GPS travelers. We've created a virtual geocache called "Diners Club" where players share their favorite diner. We had no idea it would be so popular! See for yourself right here: http://www.geocaching.com/seek/cache_details.asp?ID=21289. If you don't think the adventure of finding good food, recommended by total strangers, isn't having fun with a GPS, then we give up. You're lost.

GPS in the Classroom

By Jim Kuhl, N2STK

GPS receivers are gradually catching on in classrooms. I began experimenting with GPS when a social studies teacher on my middle school team brought a GPS to school. Her husband used it in his boat for fishing. She taught latitude and longitude to her students and thought it would have more meaning if she could show her students the way parallels and meridians intersected near the school. She took her class outside and using the GPS lined them up along a parallel and a meridian that intersected in the school's parking lot.

Many of the concepts you must teach kids (example: latitude and longitude are measured with imaginary lines) were taught by the experience. Measuring latitude and longitude took on special meaning as the kids found their place on the lines using the handheld device that reminded them of their favorite portable game. We find kids are more open to learning about latitude and longitude when you throw interesting technology into the lesson.

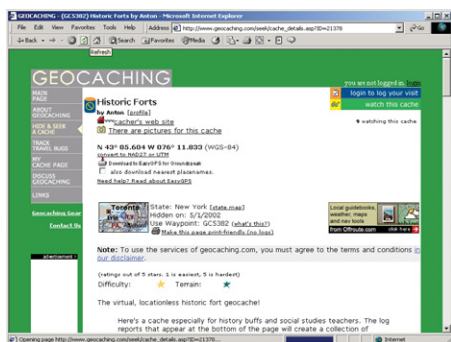
From social studies we graduated to science and math. In science class we were observing and identifying the plants and animals on a plot of land near the school. We traditionally used this activity to involve math students with science class. Groups in math class would measure the perimeter of our property using meter sticks and tape measures. They could use the measurements of length and width to calculate the area of the plot of land. In the past, groups of students would compare their measurements to determine reasonable dimensions for the property.

With the GPS we had another way to measure the dimensions of the property. Students found the latitude and longitude of the corners of the property. In the early days I had them

walk 10 yards on a football field with a GPS to equate change in latitude and longitude with yardage. There is a site on the Internet that does that conversion for you. We used these measurements to determine the difference in density of plant and animal species on the property. Interest in science, math, latitude and longitude (geography) soared using these high interest, and hands-on activities. From tests given after the activities and other lessons, we found that students were understanding these concepts better than when we had used traditional methods to teach them.

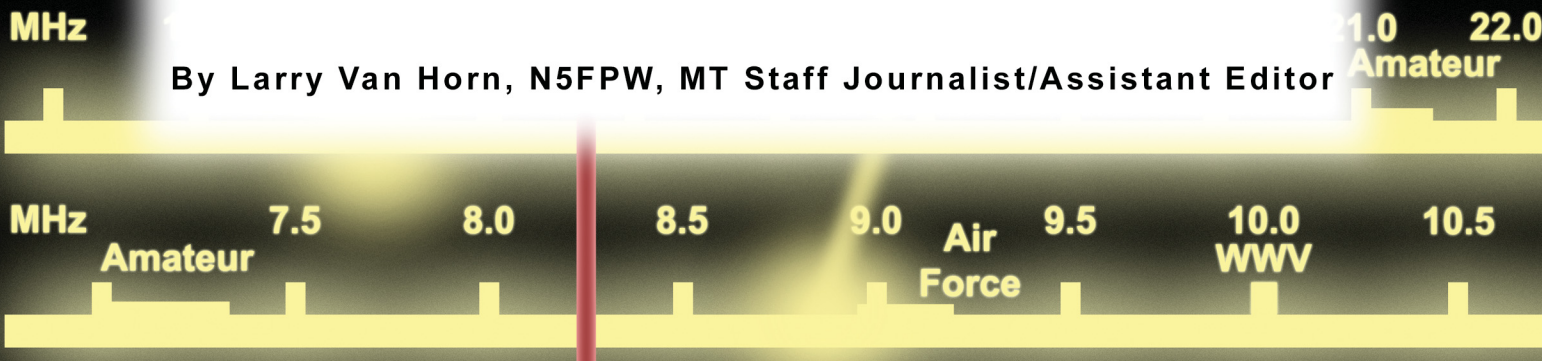
After a major change in curriculum in my school district, I found myself teaching earth science which included the topics of topographic maps and (you guessed it) latitude and longitude. Enter Geocaching. Students were now learning to use GPS receivers and interpret topographic maps so they could go on a 21st century treasure hunt. In addition to finding parallels and meridians near the school, they used the GPS to find the coordinates of familiar objects near the school. They also learned to enter waypoints into the GPS and navigate to them. Carrying a topographic map with the GPS gave them a better understanding of the meaning of contour lines.

The activity that really excited students was plugging a GPS into a laptop computer displaying a topographic map. The GPS plotted their every move on the map. It happened that the school was built after the map was drawn, so using the GPS, students were able to draw the school on the map. As a result of these activities some students became so good at reading and interpreting topographic maps that they were finding Geocaches without the aid of a GPS receiver.



Who's Who in the Radio Spectrum (Part 7) Your Road Map to the VHF/UHF Bands

By Larry Van Horn, N5FPW, MT Staff Journalist/Assistant Editor



Nicknamed the “Action Bands,” the frequencies above 108 MHz afford the scanner listener the opportunity to listen to a wide variety of communications from orbiting satellites to local public safety agencies.

What Can You Hear and Where

Remember that since VHF and UHF propagation are usually “line of sight,” frequency allocations and usage is far more localized on frequencies above 30 MHz. The following is a summary of the main frequency bands from 108 to 400 MHz.

108 to 137 MHz

The frequencies just above the FM broadcast band are allocated for civilian aviation communications. The mode used in this band is AM.

108.000-117.950	VHF omni-range
108.100-111.950	ILS localizers
118.000-121.400	Air traffic control (towers/centers)
121.500	Civilian aircraft emergency
121.600-121.925	Ground control (25 kHz spacing)
121.600	Civil Air Patrol Nationwide
121.775	Civil Air Patrol Nationwide
121.950	Flight schools
121.975	Flight service stations (private aircraft)
122.000	Flight service stations (national flight watch-private aircraft)
122.025	Flight service stations (private aircraft)
122.050	Flight service stations (aircraft transmit)
122.075	Flight service stations (private aircraft)
122.100-122.675	Flight service stations (private aircraft transmit)
122.700	Unicom (uncontrolled airports)
122.725	Unicom (uncontrolled airports-private aircraft only)
122.750	Unicom (private air-to-air fixed wing)
122.800	Unicom (uncontrolled airports)
122.825	ARINC/Airline company frequency (aero enroute)
122.850	Multicom/NOAA severe storms study aircraft/U.S. Forest Service helicopter operations
122.875	ARINC/Airline company frequency (aero enroute)
122.900	Multicom/Numerous government agencies and military services
122.925	Multicom (plane-to-plane/Numerous government agencies and military services)
122.950	Unicom (controlled airports)

122.975	Unicom (high altitude)
123.000	Unicom (uncontrolled airports)
123.025	Unicom (helicopters/air-to-air)
123.050	Unicom (heliports)
123.075	Unicom (heliports)
123.100	U.S. Coast Guard/Civil Air Patrol search and rescue
123.125	U.S. Air Force NAVAID flight check
123.125-123.475	Flight Test (Itinerant: 123.125/.150/.175/.400)
123.150	Air show common frequency
123.200	Flight schools/Flight Manufacturers
123.300	Flight schools/Balloons
123.350	NASA ER-2 aircraft nationwide
123.400	Flight schools
123.450	Multicom (air-to-air informal)
123.500	Flight schools/balloons
123.525-123.575	Flight Test (Itinerant: 123.575)
123.550	Canadian Military Dewline ATC frequency nationwide
123.600-128.800	Air traffic control (towers/centers)
126.200	U.S. military control towers/ground controls
128.625	NASA/NOAA research frequency
128.825-132.000	ARINC/Airlines company frequencies
130.650	USAF Air Mobility Command (AMC) command post/contract airlines nationwide
132.025-135.975	Air traffic control (towers/centers)
134.100	Military airports (ground controlled approach radar)
135.850	Federal Aviation Administration/U.S. Air Force/Army NAVAID flight inspection
135.950	Federal Aviation Administration/U.S. Army NAVAID flight inspection
135.975	U.S. Forestry Service air-to-ground (wildfires)
136.000-136.075	Air traffic control operations
136.100	Reserved for future unicom or automatic weather observation stations
136.125-136.175	Air traffic control operations
136.200	Reserved for future unicom or automatic weather observation stations
136.225-136.250	Air traffic control operations
136.275	Reserved for future unicom or automatic weather observation stations
136.300-136.350	Air traffic control operations
136.375	Reserved for future unicom or automatic weather observation stations
136.400-136.450	Air traffic control operations
136.475	Reserved for future unicom or automatic weather observation stations
136.500-136.875	Aeronautical enroute (domestic VHF)
136.900-136.975	Aeronautical enroute (domestic/international VHF)

137-138 MHz

The main users of this portion of the spectrum are downlink transmissions from orbiting polar weather and Russian imaging satellites.

These satellites use an FM facsimile signal that is wider than most consumer scanners are equipped to monitor properly. You will need to buy a specialized receiver and decoding capability if you want to view images from these orbiting spacecraft. The most common satellites heard on these frequencies are listed below.

137.300	Meteor 3-05 (Russian polar orbiting weather satellite)
137.400	Meteor 2-21 (Russian polar orbiting weather satellite)
	Okean (Russian oceanographic, radar-visible-microwave imaging satellite)
	Sich (Russian oceanographic, radar-visible-microwave imaging satellite)
137.500	NOAA 12/15 (US polar orbiting weather satellite)
137.620	NOAA 14/16 (US polar orbiting weather satellite)
137.850	Resurs 01-4 (Russian imaging satellite)



Photo credit: Harry Baughn

138-144 MHz

The primary user of this band in the United States is the military. This is primarily a land mobile allocation and those agencies using these frequencies for this use narrowband FM. How-



ever, in recent years the military has installed radios in tactical aircraft that also cover this band. So, don't be surprised if you hear air-to-air AM mode communications from military aircraft in this band. Channel spacing is 12.5 kHz.

144-148 MHz

This is the amateur 2-meter band. It is the most popular and populated of the amateur VHF/UHF assignments. Like other ham bands, 2-meters has been divided up into subbands for various modes. The breakout for these subbands is indicated below.

144.000-144.050	CW Earth-Moon-Earth (EME)
144.050-144.100	General CW and weak signals
144.100-144.200	EME and weak-signal SSB
144.200	National SSB calling frequency
144.200-144.275	General SSB operation
144.275-144.300	Propagation beacons
144.300-144.500	New OSCAR satellite subband
144.500-144.600	Linear translator inputs
144.600-144.900	FM repeater inputs
144.900-145.100	Weak signal and FM simplex (145.010 145.030 145.050 145.070 145.090 are widely used for packet)
145.100-145.200	Linear translator outputs
145.200-145.500	FM repeater outputs
145.500-145.800	Miscellaneous and experimental modes
145.800-146.000	OSCAR satellite subband
146.010-146.370	Repeater inputs
146.400-146.580	Simplex
146.610-146.970	Repeater outputs
147.000-147.390	Repeater outputs
147.420-147.570	Simplex
147.600-147.990	Repeater inputs

148-150.800 MHz

This is another military land mobile allocation. In addition to the description in the 138-144 MHz section, there are also satellite signals commonly heard in this range. The Russians still have orbiting navigation satellites that use a form of frequency shift keying (FSK) on the following frequencies: 149.910 149.940 149.970 150.000 150.030 MHz.

150.800-174 MHz

The frequencies in this range are allocated to the land mobile and maritime mobile services. The mode of operation is narrowband FM. Normal channel spacing is 7.5 and 12.5 kHz spacing. Commonly known as the VHF high band, you will find a lot of activity in this frequency range. You will find detailed frequency assignments posted on the *Monitoring Times* website at: http://www.monitoringtimes.com/html/mt_reference_library.html#Scanner Topics.

In this portion of the spectrum we have one of two marine bands in the VHF/UHF spectrum. Table 1 gives a detailed breakout of the frequencies in this band.

150.8000-156.2475	Non-federal dispatch, PLMR conventional, some paging. New Interagency frequencies: 151.1375, 154.4525, 155.7525, 158.7375 and 159.4725 MHz
157.4500-161.5750	Non-federal dispatch, PLMR conventional, some paging. VHF marine band public safety set-aside consists of Channels 25 and 84 (157.225/161.825 MHz), and in the other areas it consists of Channels 25 and 85 (157.275/161.875 MHz).
161.6250-161.7750	Non-federal dispatch, PLMR conventional, some paging on 162-174 MHz, spacing of 12.5 kHz (6.25 kHz)
162.0125-173.2000	Federal dispatch
162.400	NOAA Weather radio frequency WX-2
162.425	NOAA Weather radio frequency WX-4
162.450	NOAA Weather radio frequency WX-5
162.475	NOAA Weather radio frequency WX-3
162.500	NOAA Weather radio frequency WX-6
162.525	NOAA Weather radio frequency WX-7
162.550	NOAA Weather radio frequency WX-1
173.2000-173.4000	Non-federal dispatch, secondary basis
173.4000-174.0000	Federal dispatch

174-216 MHz

Television channels 7-13 are located in this range. The video portions will sound like distorted noise on a scanner. The audio portions are in FM, but will sound "clipped" and "tinny" unless your scanner can tune this range using wide band FM. Also, the US government is allowed to conduct experimental operations in this band on a non-interference basis. Used primarily for experimental testing and equipment checkout.

Channel	Bandwidth	Video	Color	Audio
Channel 7	174-180	175.250	178.830	179.750
Channel 8	180-186	181.250	184.830	185.750
Channel 9	186-192	187.250	190.830	191.750
Channel 10	192-198	193.250	196.830	197.750
Channel 11	198-204	199.250	202.830	203.750
Channel 12	204-210	205.250	208.830	209.750
Channel 13	210-216	211.250	214.830	215.750

216-220 MHz

This band is one of the most interesting and unexplored portions of the radio spectrum. There are many interesting services in this band including space radar, transportation, telemetry, amateur and personal radio services.

The Naval Space Command operates a large satellite and missile sensing radar on 216.980 MHz. It is known as Naval Space Surveillance System (NAVSPASUR) or "The Fence." This

system uses the largest CW transmitter in the world and if you are equipped with a multi-mode communication receiver (i.e. Icom 7000/7100/8500, etc), and live in the southern portion of the United States from California to Georgia, you can monitor the return pips as orbiting objects cross "The Fence."

The Automated Maritime Telecommunications System (AMTS) consists of maritime public coast stations that provide voice and data communications, somewhat like a cellular phone system. Tugs, barges and other vessels on U.S. waterways utilize this system. Frequencies for AMTS stations fall in two bands: 217-218 MHz and 219-220 MHz.

The 219-220 MHz band is also allocated to the amateur service on a secondary basis for stations participating, as forwarding stations, in point-to-point fixed digital message forwarding systems, including intercity packet backbone networks.

A wide variety of data signals can be heard in the 216-220 MHz band. Wildlife transmitters, ocean buoys, and stations authorized in the Industrial/Business pool send telemetry in this frequency range.

The 218-219 MHz Service is the new name for the former Interactive Video and Data Service (IVDS). You will find a wide variety of licensees in this portion of the spectrum. The FCC has been tinkering with this portion of the spectrum for quite some time and the final allocations for this band are still up in the air.

220-222 MHz

In 1988, the FCC reallocated this portion of the spectrum from amateur radio use to the Private Mobile Radio Service. The principle requester was *United Parcel Service* (UPS) which needed radios for its vehicles.

However, after the initial order taking this band away from the hams, followed by Congressional hearings and litigation over the allocation and licensing process, the nature of communications in this band has changed. The band has gradually developed into services using narrowband voice and data. There are even allocations in this band for public safety agencies.

222-225 MHz

This is the amateur 1.25-meter band. Like other ham bands, 1.25-meters has been divided up into subbands for various modes. The breakout for these subbands is indicated below.

222.000-222.150	Weak-signal modes
222.000-222.025	EME
222.050-222.060	Propagation beacons
222.100	SSB & CW calling frequency
222.100-222.150	Weak-signal CW and SSB
222.150-222.250	Local coordinator's option; weak signal, ACSB, repeater inputs, control
222.250-223.380	FM repeater inputs only
223.400-223.520	FM simplex
223.520-223.640	Digital, packet
223.640-223.700	Links, control
223.710-223.850	Local coordinator's option; FM simplex, packet, repeater outputs
223.850-224.980	Repeater outputs only

225-400 MHz

This portion of the spectrum is devoted to military aircraft, tactical and training communi-



Photo Credit: Aerials, Inc



cations, satellite links for ground, air, surface and subsurface users, rocket test and telemetry, position location networks, and Presidential communications. Radio hobbyists will hear some of the most exciting communications transmitted in the VHF/UHF spectrum in this 175 MHz-wide range. The primary mode used is AM with 25 kHz spacing, but military satellites downlinking in this spectrum use a wide variety of modes with variable spacing. A comprehensive list of nationwide assignments is found in Table 2.

In Conclusion

There is a lot to monitor in the 108-400 MHz range. So load up some of the frequencies in this article and enjoy monitoring the “Action Bands.”

Table One – VHF Marine Band Frequencies

Chan	Ship Tx	Ship Rx	Use
01A	156.050	156.050	Port Operations and Commercial. VTS* in selected areas.
05A	156.250	156.250	Port Operations. VTS in Seattle
06	156.300	156.300	Intership Safety
07A	156.350	156.350	Commercial
08	156.400	156.400	Commercial (Intership only)
09	156.450	156.450	Boater Calling. Commercial and Non-Commercial.
10	156.500	156.500	Commercial
11	156.550	156.550	Commercial. VTS in selected areas.
12	156.600	156.600	Port Operations. VTS in selected areas.
13	156.650	156.650	Intership Navigation Safety (Bridge-to-bridge). Ships >20m length maintain a listening watch on this channel in US waters.
14	156.700	156.700	Port Operations. VTS in selected areas.
15			156.750 Environmental (Receive only). Used by Class C EPIRBs.
16	156.800	156.800	International Distress, Safety and Calling. Ships required to carry radio, USCG, and most coast stations maintain a listening watch on this channel.
17	156.850	156.850	State Control
18A	156.900	156.900	Commercial
19A	156.950	156.950	Commercial
20	157.000	161.600	Port Operations (duplex)
20A	157.000	157.000	Port Operations
21A	157.050	157.050	U.S. Coast Guard only

22A	157.100	157.100	Coast Guard Liaison and Maritime Safety Information Broadcasts. Broadcasts announced on channel 16.	226.150	ACC Training Exercises
23A	157.150	157.150	U.S. Coast Guard only	226.250	ACC Training Exercises
24	157.200	161.800	Public Correspondence (Marine Operator)	227.725	Air Force E-8 JStars Discrete
25	157.250	161.850	Public Correspondence (Marine Operator)	227.875	ACC Training Exercises
26	157.300	161.900	Public Correspondence (Marine Operator)	227.900	USAF Air-to-Air
27	157.350	161.950	Public Correspondence (Marine Operator)	227.925	Air Force E-8 JStars Discrete
28	157.400	162.000	Public Correspondence (Marine Operator)	227.950	ACC Training Exercises
63A	156.175	156.175	Port Operations and Commercial. VTS in selected areas.	228.050	ACC Training Exercises/Air Force E-8 JStars Discrete
65A	156.275	156.275	Port Operations	228.100	USAF Air-to-Air
66A	156.325	156.325	Port Operations	228.150	ACC Training Exercises
67	156.375	156.375	Commercial. Used for Bridge-to-bridge communications in lower Mississippi River. Intership only.	228.225	Air Force E-8 JStars Discrete
68	156.425	156.425	Non-Commercial	228.250	ACC Training Exercises
69	156.475	156.475	Non-Commercial	228.300	Air Force Special Operations
70	156.525	156.525	Digital Selective Calling (voice communications not allowed)	228.350	USAF Ferry Flight Air-to-Air
71	156.575	156.575	Non-Commercial	228.400	NORAD
72	156.625	156.625	Non-Commercial (Intership only)	228.475	ACC Training Exercises
73	156.675	156.675	Port Operations	228.550	Aerial Refueling
74	156.725	156.725	Port Operations	228.600	NORAD
77	156.875	156.875	Port Operations (Intership only)	228.650	ACC Training Exercises
78A	156.925	156.925	Non-Commercial	228.700	NORAD
79A	156.975	156.975	Commercial	228.725	ACC Training Exercises
80A	157.025	157.025	Commercial	228.750	Air Force E-8 JStars Discrete
81A	157.075	157.075	U.S. Government only - Environmental protection operations.	228.800	NORAD
82A	157.125	157.125	U.S. Government only	228.850	ACC Training Exercises
83A	157.175	157.175	U.S. Coast Guard only	228.900	NORAD
84	157.225	161.825	Public Correspondence (Marine Operator)	228.975	ACC Training Exercises
85	157.275	161.875	Public Correspondence (Marine Operator)	229.075	ACC Training Exercises
86	157.325	161.925	Public Correspondence (Marine Operator)	229.100	NORAD
87	157.375	161.975	Public Correspondence (Marine Operator)	229.275	ACC Training Exercises
88	157.425	162.025	Public Correspondence only near Canadian border.	230.700	USAF Air-to-Air
88A	157.425	157.425	Commercial, Intership only.	231.750	Air Force E-8 JStars Discrete
* VTS - Vessel Traffic Service				233.600	NORAD
				234.600	NORAD
				234.700	NORAD
				235.050	Air Force E-8 JStars Discrete
				235.100	Aerial Refueling
				235.150	ACC Training Exercises
				235.175	Air Force E-8 JStars Discrete
				235.250	USAF Thunderbirds
				235.400	NASA Air-to-Air
				235.800	NORAD
				235.900	NORAD
				236.000	USAF Survival Rescue
				236.150	ACC Training Exercises/Air Force E-8 JStars Discrete
				236.250	USN Air-to-Air
				236.350	USN Air-to-Air
				236.550	ACC Training Exercises
				236.600	Military Control Towers
				236.650	ACC Training Exercises
				236.750	Aerial Refueling
				237.150	USAF AWACS
				237.900	USCG Rescue Coordination
				238.050	USN E-2 Hawkeye Air-to-Air
				238.350	ACC Training Exercises/Air Force E-8 JStars Discrete
				238.400	NORAD
				238.500	NORAD
				238.650	Aerial Refueling
				238.900	Aerial Refueling
				239.200	NORAD
				239.400	NORAD
				239.650	USAF Drop Zone Training
				239.700	NORAD
				239.800	USAF Weather
				239.950	Air Force E-8 JStars Discrete
				240.100	USAF Drop Zone Training
				240.200	NORAD
				241.000	USA Towers/National Guard Operations
				243.000	Military Distress, Safety and Calling
				243.500	NORAD
				243.700	
				-244.225	Military UHF Satellite Downlinks (5 kHz spacing)
				248.845	
				-249.335	Military UHF Satellite Downlinks (5 kHz spacing)
				248.850	
				-249.850	Military UHF Satellite Downlinks (25 kHz spacing)
				250.350	
				-250.750	Military UHF Satellite Downlinks (25 kHz spacing)
				250.800	NORAD
				250.900	Air Force E-8 JStars Discrete
				251.000	NORAD
				251.250	NORAD
				251.600	USN Blue Angels
				251.800	NORAD

**Table Two –
Nationwide UHF Military Frequencies**

Legend:

ACC	Air Combat Command (USAF)
AMC	Air Mobility Command (USAF)
FAA	Federal Aviation Administration
NASA	National Aeronautics and Space Administration
NORAD	North American Aerospace Defense Command
USA	US Army
USAF	US Air Force
USN	US Navy

Frequency	Service
225.000	NORAD
225.150	Air Force E-8 JStars Discrete
225.400	Military Ground Control/Clearance Delivery
225.450	ACC Training Exercises
225.575	Air Force E-8 JStars Discrete
225.600	NORAD
225.650	ACC Training Exercises
225.725	ACC Training Exercises/Air Force E-8 JStars Discrete
225.800	USAF AWACS
225.850	ACC Training Exercises
225.875	USAF Air-to-Air
225.900	USAF Air-to-Air
225.950	ACC Training Exercises
225.975	Air Force E-8 JStars Discrete
226.025	Air Force E-8 JStars Discrete
226.100	USAF Air-to-Air Special Operations

251.850		278.200	NORAD	314.500	Aerial Refueling	356.000	NORAD
-258.650	Military UHF Satellite Downlinks	278.400	NORAD	314.600	Civilian Contractors	357.100	NORAD
251.900	USAF Survival Rescue	278.600	NORAD	315.275	Air Force E-8 JStars Discrete	358.200	USAF Air-to-Air
252.000	NORAD	279.000	NASA Space Shuttle Air-to-Ground	315.400	NORAD	359.100	Aerial Refueling
252.100	Air Force Reserve/Air National Guard Command Post	279.400	NORAD	316.200	NORAD	359.800	NORAD
		279.750	Air Force E-8 JStars Discrete	316.300	NORAD	360.075	USAF Air-to-Air
252.925	Air Force E-8 JStars Discrete	279.800	Aerial Refueling	317.950	USAF AWACS	360.200	USN Towers
253.375	USAF Air-to-Ground Tactical Operations	279.850	AMC Airlift/Combat Control Teams	318.000	Aerial Refueling	360.500	USN Aerial Refueling Common
254.200	NORAD	281.500	NORAD	318.100	NORAD	360.700	NORAD
254.500	NORAD	281.600	NORAD	318.300	USAF Air-to-Ground Tactical Operations	361.700	Aerial Refueling
254.600	Aerial Refueling	282.500	NORAD	318.400	NORAD	364.200	NORAD AICC
255.400	FAA Flight Service Stations	282.600	NORAD	319.400	AMC Air-to-Air/Command Post	366.200	Aerial Refueling
255.750	Aerial Refueling	282.700	Aerial Refueling	319.500	Aerial Refueling	368.600	Aerial Refueling
255.800	NORAD	282.800	Military Search and Rescue (SAR)	319.700	USAF Air-to-Air	369.000	NORAD
256.600	NORAD	283.750	AMC Airlift/Combat Control Teams	320.600	USAF AWACS	369.100	USAF Air-to-Ground Tactical Operations
257.250	Air Force E-8 JStars Discrete	283.800	ACC Air-to-Air	320.900	Aerial Refueling	370.400	Aerial Refueling
257.800	Civilian/USAF Control Towers	283.900	Aerial Refueling	321.000	ACC Command Post/Air-to-Air (Secondary)	371.000	NORAD
258.000	NORAD	284.000	NORAD			371.800	NORAD
258.575	USAF Air-to-Ground Tactical Operations	284.150	Air Force E-8 JStars Discrete	321.300	NORAD	372.200	USAF Pilot-to-Dispatcher
259.000	USAF SAR Operations/Training	284.600	NORAD	322.800	Aerial Refueling	372.300	Aerial Refueling
259.600	NORAD	284.800	NORAD	322.950	USAF Thunderbirds	374.000	NORAD
259.700	NASA Space Shuttle Air-to-Ground	285.900	NORAD	324.000	NORAD	375.100	NORAD
259.800	USAF Air-to-Ground Tactical Operations	286.200	ACC Air-to-Air	324.200	USAF Air-to-Ground Tactical Operations	375.200	USAF/USA Weather
260.200	Aerial Refueling	286.300	Aerial Refueling	324.400	Aerial Refueling	375.700	Aerial Refueling
260.350		286.900	Aerial Refueling	324.600	USAF Air-to-Air	375.725	USAF AWACS
-260.850	Military UHF Satellite Downlinks (25 kHz spacing)	287.500	NORAD	324.650	USAF AWACS	375.825	USAF AWACS
		287.650	AMC Airlift/Combat Control Teams	325.000	NORAD	375.925	USAF AWACS
260.800	NORAD	288.200	USAF AWACS	325.500	NORAD	375.975	USAF AWACS
260.900	NORAD	288.400	NORAD	325.800	NORAD	376.025	USAF AWACS
261.200	USAF AWACS	288.900	Aerial Refueling	326.300	USAF Air-to-Ground Tactical Operations	376.125	USAF AWACS/Air Force E-8 JStars Discrete
261.450		289.050	Air Force E-8 JStars Discrete	326.400	NORAD		
-262.550	Military UHF Satellite Downlinks (25 kHz spacing)	289.400	USAF Ground Control	327.200	NORAD	376.200	NORAD
		289.700	Aerial Refueling	327.600	Aerial Refueling	377.000	NORAD
261.600	NORAD	291.900	Aerial Refueling	327.900	NORAD	378.200	Aerial Refueling
261.700	NORAD	292.000	AMC Air-to-Air	328.000	NORAD	378.900	USAF Air-to-Ground Tactical Operations
261.800	NORAD	292.400	NORAD	328.200	USN Fleet AEW discrete	379.000	NORAD
262.325	NORAD	292.600	Aerial Refueling	328.600		380.850	Air Force E-8 JStars Discrete
262.400	NORAD	292.700	NORAD	335.400	Instrument Landing System (ILS)	381.000	USAF SAR Operations/Training
262.450	Air Force E-8 JStars Discrete	292.800	NORAD	335.700	USAF Air-to-Ground Tactical Operations	381.300	ACC Command Post/Air-to-Air
262.800	NORAD	293.000	Aerial Refueling	335.800	Military Ground Control/Clearance Delivery	381.700	USCG Air-to-Ground/Air-to-Air
263.200	NORAD	293.200	NORAD			381.800	USCG Air-to-Ground/Air-to-Air
263.550		293.550	Air Force E-8 JStars Discrete	335.950	USAF AWACS	382.600	Civilian Contractors
-264.050	Military UHF Satellite Downlinks (25 kHz spacing)	293.600	NORAD	336.100	Aerial Refueling	383.000	NORAD
		294.800	USAF Air-to-Ground Tactical Operations	336.600	NORAD	383.900	USCG Air-to-Ground/Air-to-Air
263.600	NORAD	295.400	Aerial Refueling	337.700	Air Force E-8 JStars Discrete	384.000	NORAD
264.400	NORAD	295.800	Aerial Refueling	338.400	NORAD	384.600	Aerial Refueling
264.600	Air Force E-8 JStars Discrete	296.200	ACC Air-to-Air	338.500	USAF Air-to-Ground Tactical Operations	386.000	NORAD
264.800	NORAD	296.650	USAF AWACS	338.800	NORAD	386.200	NORAD
264.900	Aerial Refueling	296.800	NASA Space Shuttle Air-to-Ground	339.200	Aerial Refueling	387.800	NORAD
265.350		297.000	AMC Air-to-Air/Air-to-Ground	340.200	USN Towers	387.800	NORAD
-269.950	Military UHF Satellite Downlinks	297.300	Aerial Refueling	340.600	AMC Airlift/Combat Control Teams	388.225	Air Force E-8 JStars Discrete
265.400	NORAD	297.600	NORAD	341.100	NORAD	388.400	Aerial Refueling
266.500	Aerial Refueling	297.700	NORAD	341.400	Aerial Refueling	388.950	USAF Air-to-Air
267.000	NORAD	297.800	NORAD	341.750	USAF AWACS	389.200	NORAD
267.800	USAF Air-to-Air/NORAD	298.100	NORAD	341.800	NORAD	390.200	NORAD
267.850	Air Force E-8 JStars Discrete	298.300	NORAD	342.100	NORAD	391.000	Aerial Refueling
269.900	NORAD	298.500	NORAD	342.500	USAF/USA Weather	391.800	Aerial Refueling
270.200	NORAD	298.650	Air Force E-8 JStars Discrete	342.600	NORAD	392.800	NORAD
270.400	NORAD	298.800	NORAD	343.100	Aerial Refueling	394.200	NORAD
271.000	NORAD	301.250	USN Air-to-Air	343.500	Aerial Refueling	394.600	Aerial Refueling
271.100	Air Force E-8 JStars Discrete	302.400	NORAD	344.000	NORAD	394.800	NORAD
271.950	Air Force E-8 JStars Discrete	303.000	NORAD	344.600	Military Weather	394.900	Aerial Refueling
273.400	NORAD	303.100	USAF AWACS/Air Force E-8 JStars Discrete	344.700	Aerial Refueling	396.200	Aerial Refueling
274.400	NORAD			345.000	Air Force E-8 JStars Discrete	396.800	NORAD
275.000	NORAD	303.275	Air Force E-8 JStars Discrete	345.400	Civilian Contractors	396.875	Inter-Squad Radio (ISR) Channel 1
275.200	Civilian Contractors	303.825	USAF Air-to-Ground Tactical Operations	346.200	NORAD	397.125	Inter-Squad Radio (ISR) Channel 2
275.350	USN Blue Angels	303.900	NORAD	347.400	NORAD	397.175	Inter-Squad Radio (ISR) Channel 3
275.700	USN Fleet Secure	305.500	Aerial Refueling	348.200	NORAD	397.250	NORAD
275.800	Civilian/Military Ground Control/Clearance Delivery	305.700	ACC Air-to-Air	348.500	USAF Air-to-Ground Tactical Operations	397.375	Inter-Squad Radio (ISR) Channel 4
		306.400	NORAD	348.600	Civilian Ground Control/Clearance Delivery	397.425	Inter-Squad Radio (ISR) Channel 5
275.900	NORAD	308.100	NORAD			397.475	Inter-Squad Radio (ISR) Channel 6
275.950	Aerial Refueling	308.700	ACC Air-to-Air	348.800	NORAD	397.550	Inter-Squad Radio (ISR) Channel 7
276.050	Air Force E-8 JStars Discrete	308.750	Air Force E-8 JStars Discrete	348.900	Aerial Refueling	397.800	NORAD
276.075	Air Force E-8 JStars Discrete	308.850	Air Force E-8 JStars Discrete	349.400	AMC Air-to-Air/Command Post	397.950	Inter-Squad Radio (ISR) Channel 8
276.100	Aerial Refueling	308.900	Civilian Contractors	350.450	Military Special Operations	398.000	NORAD
276.400	NORAD	309.400	NORAD	351.025	Air Force E-8 JStars Discrete	398.050	Inter-Squad Radio (ISR) Channel 9
276.500	Aerial Refueling	309.500	NORAD	351.500	NORAD	399.000	NORAD
276.650	NORAD	311.000	ACC Command Post/Air-to-Air (Primary)	351.600	NORAD	399.425	Inter-Squad Radio (ISR) Channel 10
276.900	Military Airborne Command Post	311.100	USAF Air-to-Ground Tactical Operations	352.600	Aerial Refueling	399.475	Inter-Squad Radio (ISR) Channel 11
277.600	NORAD	312.800	NORAD	352.700	Aerial Refueling	399.725	Inter-Squad Radio (ISR) Channel 12
277.800	USN Fleet Common/Warning	313.600	USAF AWACS	352.900	Aerial Refueling	399.925	Inter-Squad Radio (ISR) Channel 13
278.000	U.S.-Russian Military Coordination (Worldwide)/NORAD	313.650	Air Force E-8 JStars Discrete	354.200	USAF Air-to-Air	399.975	Inter-Squad Radio (ISR) Channel 14
		314.450	Air Force E-8 JStars Discrete	355.200	NORAD		

VOZ CRISTIANA: A MODERN CHRISTIAN STATION

By Kenneth D. MacHarg

A relatively new radio signal is making a mighty impact throughout the Americas. It's Voz Cristiana, or Christian Voice, a newcomer to the shortwave spectrum that is also popping up on local stations throughout the region with its satellite service.

Tune your dial across the international band in a Mexico City hotel room or at a lakeside resort in the middle of Brazil and you will hear the clear signal and professional sound that Voz Cristiana beams from a mammoth shortwave facility built by the controversial Chilean dictator, Augusto Pinochet. The shortwave outlet has recently begun broadcasting in Portuguese to Brazil. In addition, Voz Cristiana programming is also heard on 66 local AM and FM stations throughout Latin America.

The station's parent company, Christian Vision, also operates a shortwave radio station, Christian Voice, in Zambia and is developing a large international broadcasting facility in Australia that will reach all of Asia and the Pacific.

"Businessman Bob Edmiston started Christian Vision in the United Kingdom in 1988," explains Terry Bennett, the organization's Director of Operations. "Despite success in the secular world, Bob had a desire to use the gifts that God had given him to introduce people to Jesus, especially in areas where the gospel needed to be heard." The organization is funded by prof-

its from Edmiston's business activities.

The result has been the development of the Christian Vision network of radio stations and satellite affiliates carrying Christian programming. "Africa was the first target, with its vast population and the largely English speaking audience," Bennett says in an interview from his office in England. "Latin America and Spanish were next. With English and Spanish being among the most widely spoken languages in the world, it makes the broadcasting audience immense. Add to this Mandarin and a large percentage of the world's population is catered to."

Broadcasting to Latin America

"We are serving a combination of people," reports Juan Mark Gallardo, the Regional Manager of Voz Cristiana. "We reach non-Christians who are seekers at the same time that we are helping people who are Christians to deepen their faith."

Gallardo explains that many listeners throughout Latin America have grown up in a Catholic background so have some knowledge of Christianity even if they are not active in their church. "We are reaching them with a professional style of broadcasting that includes music, news, sports, a total blessing without preaching at them," Gallardo says.

Using a blend of Bible-based teaching and contemporary Christian music, Christian Voice programs tend to be similar to that of a local station. "Other international broadcasters switch from one language to another to provide for as many different people as possible," Bennett explains. "Christian Vision broadcasts in one language and tries as much as possible to relate to the local audience."

"Our station is predominantly presenter led and we have presenters airing shows 24 hours a day," he adds. "This is our favored format and we feel that it works alongside the other styles of Christian radio."

The station's daily schedule involves a wake-up program in the morning, plus youth oriented shows, a men's release, and several programs for women, including *The Woman of Today*, hosted by Norma Pinzón from the station's Miami studios. "The program serves to build the basis of the family that the Lord established in His word," Pinzón explains. "By means of different segments (such as Christian psychology, improving a Christian



Voz Cristiana Broadcast Schedule

Listeners in North America can hear Voz Cristiana in Spanish on the following shortwave frequencies:

Mexico, Central America and the Caribbean

1100 – 1300 UTC (7 a.m. – 9 a.m. EDT) 11935 kHz
1300 – 1400 UTC (9 a.m. – 10 a.m. EDT) 21550 kHz

Northern South America and Central America

0000-1400 UTC (8 p.m. – 10 a.m. EDT) 15375 kHz
1400-2400 UTC (10 a.m. – 8 p.m. EDT) 17680 kHz

Brazil

0100 – 1100 UTC (9 p.m. – 7 a.m. EDT) 11745 kHz
2100 – 0100 UTC (5 p.m. – 9 p.m. EDT) 11745 (Sat, Sun)
1100 – 2100 UTC (7 a.m. – 5 p.m. EDT) 21500 kHz (Sat, Sun)

Southern Cone

2200 – 1000 UTC (6 p.m. – 6 a.m. EDT) 6070 kHz
1200 – 2200 UTC (8 a.m. – 6 p.m. EDT) 9635 kHz

In Portuguese

1100-2100 UTC (7 a.m. – 5 p.m. EDT) 21500 kHz (Mon-Fri)
1100-2100 UTC (7 a.m. – 5 p.m. EDT) 11745 kHz (Mon-Fri)
0700-1100 UTC (3 a.m. – 7 a.m. EDT) 11890 kHz

Many of the frequencies directed towards Central America can be heard well in North America.

Voz Cristiana can also be heard over portions of the southeastern U.S. at 1700 kHz on the extended AM band after 9 p.m. Eastern time (later some evenings).

In addition, Voz Cristiana programming can be heard on the internet at <http://www.VozCristiana.com>. An English-language website for Christian Vision can be found at <http://www.christianvision.com>.

marriage, how to make yourself beautiful on the outside and the inside, health, etc) we demonstrate that with Jesus, we are able to have a happy home." Pinzón was an actress and radio presenter in Colombia and Miami before beginning work at Voz Cristiana when it went on the air three years ago. "At this time, I am using my talent only in the service of the Lord, to His glory," she says.

That people are responding is evident to Gallardo and his team. "We are receiving

around 500 letters a month here, mostly in response to our shortwave broadcasts and the streaming audio on the internet," he says. "Then, the local stations that carry our programs also receive response from listeners."

Transmitter Sites and QSLs

Christian Vision offers the radio enthusiast a number of opportunities to DX and collect those valued QSL cards.

"There are 8 Harris SW-100 shortwave transmitters (100kW) of 1970s vintage, previously belonging to Radio Nacional de Chile," says Andrew Flynn, Christian Vision's chief engineer. "Christian Vision acquired the site in 1996, and brought up the facilities with services to Latin America, launching officially in 1998."

"By way of antennas, there are three TCI 527 directional log-periodic arrays, four TCI 611 4x4 curtains, two of which are slewable, and a home-built 2x1 dual band, bidirectional dipole with slew," Flynn explains. "Presently the log-periodics and home-built antenna are used for our services to Latin America, but it is intended that in the future the curtains will be used for additional services towards Africa and Europe as well as Brazil."

The site is at Calera de Tango, about 35km to the southwest of Santiago. Flynn, who served as the Chile transmitter site manager for several years, says that reception reports are welcomed, and QSL cards are sent for those reports that can be verified.

At the organization's original shortwave site in Zambia, Christian Vision uses a single Continental 418-E 100kW transmitter (1994) which is used with a TCI 615 (omni-log) antenna for English services to central and southern Africa, on 4965kHz, 6065kHz, and 9865kHz.

"Christian Vision has acquired the former



Radio Australia facility at Cox Peninsula near Darwin, Australia," Flynn says. "This facility includes a Thomson 2320 (300kW), two Thomson 2326 (250kW) and three Collins 821A (250kW). By way of antennas there are seven TCI 611 slewable curtains pointing in an arc across Asia, giving superb coverage to that region. Christian Voice Australia provides English services to targets in Asia, with services in Hindi and Mandarin to follow."

Free Programming Spreads the Word

While Christian Vision continues to spend considerable energy on its growing number of international shortwave outlets, Gallardo is also excited about the organization's increasing presence on local radio stations throughout the Americas, including the United States.

"We're on 55 stations in Central and South America now, and adding more every week," Gallardo exclaims. The organization's programming can be heard on local stations in Argentina, Bolivia, Peru, Colombia, Paraguay, the Dominican Republic, Guatemala, Panama and Venezuela.

In addition, Voz Cristiana has added an affiliate in North Carolina and two stations in Miami. One of the Florida stations, Radio Luz, at 1700 on the AM dial, can be heard





well throughout the southeastern United States in the late evening. "Miami is an international city," Gallardo says. "For us, there are many resources, including people, who come here from many countries and many Christian leaders who pass through and are available for interviews."

As the Spanish-speaking population continues to grow in the United States and expands to areas of the country where there is enough Spanish to justify radio programming, Gallardo is looking to sign up new affiliates across the country. "Voz Cristiana provides 24 hour radio programming especially for radio stations that want to add a variety of styles and segments to their existing outreach," Gallardo explains. "We try to be as versatile as we can so that any radio station can take down hours at a time or just a short segment of only a few minutes."

"If a station needs programming to reach the women, men, young people or children, then they could take a two to three hour block of programs we have to meet that need," he says. "We offer complete flexibility because we believe only the local station knows what would work best for their local audience."

The service is free of charge to non-profit organizations. Commercial stations are charged a monthly fee depending on their monthly revenue in proportion to how much of the service they would use. Voz Cristiana offers eight minutes an hour for local commercial or program insertion.

With a C-Band satellite dish of no less than 2.4 meters and the purchase of a Comstream Decoder any station can receive the signal of Voz Cristiana.

"We are wanting local AM and FM stations throughout the Americas including the United States, Mexico, the Caribbean, Central and South America to contact us if they are interested in becoming an affiliate of Voz Cristiana," Gallardo says. Interested stations can contact Voz Cristiana at Voz Cristiana, 15485 Eagle Nest Lane, Suite 220, Miami Lakes, FL 33014.

Gallardo says that he is very fulfilled in his ministry. "I think this is a fulfillment of God's call on my life. Because we don't have to raise funds or sell commercial time, we can hire a professional staff to bring the good news of Christ throughout the world."

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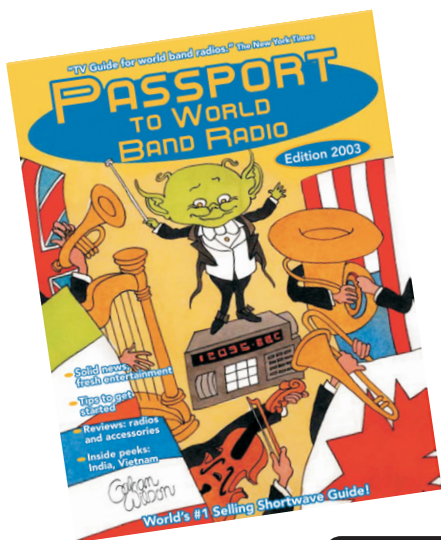
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Basic Toolbox for your Monitoring Hobby

Most beginners in the radio hobby have enough to do just to keep track of their latest loggings, but there comes a time when a beginner needs to venture out of the listen-only mode and into the world of soldering irons and wire cutters. I've found that there are a couple of basic hand tools which are easy to use and go a long way toward making my radio hobby more interesting. Unless you're planning to make electronic repair your vocation I find that the tools offered at your local Radio Shack store are cheap and adequate for beginners. There's really no need to buy expensive tools if you won't need them more than a few times a year.

◆ The Basics

The first thing you'll want is, in fact, a soldering device – either a gun or a “pencil” iron. With a gun the heat is applied to the tip via a trigger in the handle delivering from 30 to 230 watts (1,100 degrees F). As long as the trigger is held the heat is applied. The “pencil” iron is on all the time and that's why you need a stand for the iron. It takes a few minutes for the tip to reach the full temperature.



Soldering work-station: two temperatures, stable holder and power “on” light. (Courtesy: Radio Shack)

Most soldering uses will require only a small amount of heat, in the 20 to 40 watt range. I like the 64-2184 (\$20) because it has a stable stand to hold the iron, a switch to go from 20 to 40 watts, and a pilot light to indicate the unit is on. There's also a sponge tray to wipe the tip between uses to keep it clean. You can get a dual-wattage iron (64-2055) with a 15-30 watt switch built-in to the handle for \$10 but you'll still need a stable stand, a sponge tray (64-2078 \$6.50), and there's no way to know the unit is plugged in.

Three other items you'll need are a pair of

“needlenose” or “longnose” pliers, wire cutters, and a wire stripper. You'll soon find the longnose pliers are indispensable for bending wire, retrieving little components from tight spaces, etc. The 64-1847 is a “4-in-1” pliers with built-in wire stripper, wire cutter and cord divider, and at \$5 it's a bargain.

I find the cutters on the 64-1847 to be adequate at best for cutting straight wire, but, for nipping leads on a printed circuit board, for example, you'll need diagonal-cutting pliers such as the 64-2043 or the 64-2045 (\$5-7).

A better wire stripper is the 64-1922 “precision wire cutter/stripper” with the ability to strip from 10 to 22 gauge wire in seven labeled steps. The best wire stripper is the 64-1919 which is an “automatic wire stripper.” This is the preferred way to strip wire from 8 to 22 gauge. It holds the wire in place and precisely strips the insulation. It's very fast, very precise, and particularly good for large projects where a lot of wire stripping is anticipated. It also gives a “nick-free” strip. But, at \$13 it may be an item you'll wait to purchase. If you've been stripping wire by hand with a pen knife you'll really appreciate the automatic stripper and wonder how you ever did without it.

You probably have a set of screwdrivers at your house but, when it comes to the confines of electronic equipment where screw heads are small and space is at a premium, you can find good use for a small set such as the 64-1963 (\$6) which features four slotted standard and two Phillips screwdrivers.

◆ A Multi-meter for All

Radio Shack carries two types of inexpensive multi-meters: analog (22-218) and digital (22-802). The advantages of the analog meter are that it is nearly half the price of the digital one, it uses one inexpensive AAA battery (\$1.50), and has replaceable test leads. That said, the disadvantages, particularly for beginners, are that the analog version features manual ranging, is difficult to read, and has no audio alert.

The digital meter is much smaller, folds up into a very compact shirt pocket case, is auto ranging, has an easy-to-read LCD display and a nice audio tone which allows you to check continuity without having to see the display. Drawbacks to the digital model include fixed test leads which would be very difficult to repair; a clumsy, flat, rotating knob to switch functions; and power is provided by two relatively expensive EPX76 watch batteries (almost \$6 for the pair). The new version of this meter has automatic power-off

which should save considerably on the expensive batteries.

A real value for beginners dealing with multi-meters is the Radio Shack book “Using Your Meter.” At 176 pages for just \$7, you can get the most out of any meter you have. Subjects explained in plain text include basic concepts of using a Volt Ohm Meter (VOM) or Digital Volt Meter (DVM), multi tester measurements, measuring individual components, and using a meter around the house – all profusely illustrated with photographs and line drawings. Don't worry if some of the text is way beyond your current grasp. If you stick around the electronics hobby a few more years a lot of it will become clear. There are still enough basic fundamentals to make this a useful beginner's book.

◆ Some Very Handy Items

The first time you apply a soldering iron to a component you're almost guaranteed to say, “Gee, I wish I had two more hands!” Well, you can with the “extra hands” tool (64-2063) which features two heavy duty alligator clips on a bar fixed to a heavy metal stand (\$10). Also attached is a magnifying glass which helps those of us who struggle to see clearly at close range. Clipping the components to be soldered together and getting a good look through the glass makes soldering tiny components a breeze. A nice desk lamp rounds out the facility in your electronics operating room.

Those seeking a little more flexibility might



Extra “hands” with magnifier holds components together while you solder. (Courtesy: Radio Shack)

use a magnified hobby lamp such as Radio Shack's 910-4944. It has a 4" diameter lens, a socket for a 60 watt bulb which is not included, and spring loaded flexible arms which allow you to maneuver the lighted area and lens right down to the work surface. It clamps to any surface up to 2" thick via a built-in C-clamp. I've used one of these for years for everything from electronics to pulling out splinters. At \$15 it's one of those items you can add later but will wonder why you waited.

My all time favorite product is the TV-tuner/control cleaner/lubricant (64-4315) which at \$8 per can might solve over half your supposed pot or switch failures. I raved about this product in a review which appeared in the August '99 issue of *MT* (pp 96, 97) and I'm happy to say that three years later I'm still raving about it. You can turn



4" Diameter lens/lamp shows a little light on your project and gives a broad field of view. (Courtesy: Radio Shack)

yourself into an electronics repair genius and gain the admiration of your in-laws by wielding a can of this stuff anytime someone complains that there's something wrong with the controls on their stereo, boombox, or car radio.

◆ Final Thought on the Toolbox

Here are some very useful, and cheap additions to the toolbox: A roll of electrical tape (64-2375) 3/4" wide and 66 feet long (\$3) can be used to insulate wires, components etc., or used as I often do to secure antenna leads and cables to the mast to keep them from flapping around. Desoldering braid (64-2090) helps undo soldering errors or remove defective parts from a circuit (\$2.50). Coax sealing tape (278-1645) is a black flexible tape which is great for sealing connections on outdoor mounted ham, shortwave or scanner antennas to protect them from the elements (\$3). Heat-shrink tubing (278-1627) is great stuff for insulating components, leads, or anywhere that bare wires might inadvertently meet. An assortment pack comes in varying diameters in 6" lengths for all purposes. A package of 12 pieces is \$2.

Keep in mind that most of these products are a one-time purchase from which you could get years of use. While you might be able to find any of the items mentioned in this column elsewhere and cheaper, I've mentioned the products in the Radio Shack catalog because of (1) the ubiquitous nature of the stores, (2) the fact that even if you don't have one near you everything may be ordered on-line or on the phone for an addi-

tional shipping fee, and (3) the Shack's fair return policy on any items deemed unsatisfactory. Try getting that from your local hamfest or flea market vendor!

There is, of course, no end to the amount of money you could spend assembling tools for electronic service, repair or diagnostics. That's not the point of this exercise. Here I've tried to assemble a low-cost, effective, easy-to-use tool box which a person without a lot of formal electronic study can use to make basic checks and tests on the equipment they already have. It's a start. And, believe me, once you've started there's no end!

You may have other ideas on items which have become indispensable to you. Let me know what they are and I'll share with the rest of our readers.

Your \$82 Basic Beginners' Toolbox

Soldering Work Station with dual-powered iron: \$20
Roll of standard 60/40 electronics solder: \$2.50
Longnose pliers: \$5
Diagonal wire cutter: \$7
6 piece screwdriver set: \$6
Roll of electrical tape: \$3
TV-tuner/control cleaner/lubricant: \$8
Package of 12, 6" pieces variable diameter heat-shrink tubing: \$2
Extra "hands" with magnifier: \$10
Desoldering Braid: \$2.50
Shirt pocket digital multi meter (on sale): \$16
Using Your Meter book for the multi meter (optional): \$7
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Q. I have several questions about amateur radio antennas (Steve Chludzinski, email)

Why do most articles I read only consider 1/2 wave dipoles? Is it because there is no real advantage over a full wave, or is it a space consideration?

A. It's because the center feed point impedance of a half-wave dipole is 50-70 ohms, that of standard coax, while the feed point impedance of a full-wave antenna is more like 1000 ohms – a terrific mismatch which translates into lost power. And, other than a change in the radiation pattern, there is no efficiency advantage in using a longer wire antenna.

Q. I have a 35-ft tree strategically placed in a location where I can string a dipole at 180 degrees. Is that suitable?

A. Trees are great supports for wire dipoles.

Q. Can I use a steel wire with a copper coating (copper weld) as opposed to pure copper?

A. The consideration here is strength and durability in winds; that's why most folks put up stranded rather than solid wire – it lasts longer in whipping wind. Otherwise, copper-clad will be just as electrically efficient as solid copper, since, at radio frequencies, the current travels virtually at the surface – right where the copper is.

Q. I am considering purchasing the ARRL Wire Antenna Classics; thumbs up or down?

A. All ARRL books are an excellent value, and accurate as well.

Q. Why do balun transformers only cover 3-40 MHz? What do the hams on 6 and 2 meters use?

A. They use baluns designed for VHF/UHF, or other matching techniques. The 3-40 MHz baluns are the standard "W2AU" design, a classic for the high frequencies, but the material in

the ferrite core is not suitable for higher frequencies.

Q. Why do most of the antenna tuners cover only 1.8 to 30 MHz?

A. Because at this lower frequency range it is harder to match a transmission line to a wire dipole. 1.8-30 MHz represents a 1600% shift in frequency, over which the feed point impedance undergoes a change from about 70 to several thousand ohms. The individual VHF and UHF ham bands, on the other hand, represent only fractional changes; two meters, for example (144-148 MHz) is only a 3% shift in frequency, and a simple antenna design can stand the entire band shift without significantly changing impedance.

And because antennas are smaller (the wavelengths are shorter) at VHF/UHF, you can even design wide coverage antennas like the discone which covers at least an 8:1 frequency ratio without substantially changing impedance. While you can also do this at shortwave frequencies, the antennas are enormous because of the longer wavelengths.

Q. I'm confused about grounding. If an antenna is mounted on a steel tower, is it grounded when it is bolted to the tower? Does that mean that your antenna is grounded and therefore useless, or is it only grounded below the feed point where the coax connects to the antenna? So, if my antenna is in a tree, do I have to mount it on a steel pole and ground the steel pole?

A. Most people misunderstand "grounding." This is a procedure which merely makes sure that the chassis of the radio is at the same electrical potential as the earth and power-line neutral and ground. It prevents electrical shocks and fires which could be caused from excessive voltage and current flow between the radio and another grounded object, and in some cases may even reduce electrical line noise interference in reception. Grounding also provides a more direct path for lightning to discharge than riding down the coax and through the radio to the power line "ground"!

Grounding an elevated antenna has absolutely nothing whatsoever to do with antenna performance, and even when it's low enough that the ground has an effect on the pattern, mea-

sures should be taken to reduce that interaction since ground currents from antenna radiation are always lossy, wasting power as heat; that's why an underground portion of an antenna is called a "worm warmer!"

So if you're talking about lightning, shock, or fire protection, then grounding is useful. It can be the tower which is immersed in conductive soil (that's a good ground), or a heavy, braided cable going to two 8-ft or deeper ground rods separated by at least 10 feet from each other. And a lightning arrestor (not an old spark-gap device, but a modern gas-discharge cartridge) in line with the antenna cable is a good measure.

Depending upon the wavelength of the operating frequency, some towers can be fed directly by coax, becoming an effective antenna for both transmission and reception. Similarly, some antennas may be made from one piece of metal, fed at two points by the center conductor and shield. On any antenna, ground the part that the shield of the coax is connected to.

Information on these and other types of antennas can be found in books from the American Radio Relay League (ARRL); visit their web site at <http://www.arrl.org>.

Q. You have often said that a random wire antenna is fine for shortwave listening, and that it doesn't have to be impedance matched. Why is it, then, when I do use an antenna tuner, I see the S-meter rise and hear the signal peak up when properly adjusted?

A. The measure of improvement in reception is the level of the desired signal above the background noise. An impedance-matching device does improve the radio frequency (RF) voltage match between the antenna and the receiver, but both the signal and the noise increase proportionately. It's the same as turning the volume control up and down; there is no improvement in signal-to-noise ratio.

Questions or tips sent to Ask Bob, c/o MT are printed in this column as space permits. If you desire a prompt, personal reply, mail your questions along with a self-addressed stamped envelope (no telephone calls, please) in care of MT, or e-mail to bgrove@grove-ent.com. (Please include your name and address.) The current Ask Bob is now online at our website: www.monitoringtimes.com

Getting Started

Bright Ideas

Gary Webbenhurst

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76

Regular readers will remember that I often use my ham transceivers as scanners. Well, the new Yaesu VX-7R has arrived. I nearly broke my arm getting out my credit card.

Four hundred and fifty regular channels with 9 different banks (groups), plus 10 one-touch memories, and 10 "Hyper-Memory" configurations. Like its predecessor, the VX-5R, you can flag any channel as a "preferential" memory channel and create a super list of high priority channels. There are also 89 preprogrammed shortwave broadcast station memories, and 280 marine channels. I have not figured out the value of the marine channels as you cannot scan the bank, and many of the frequencies are in the public service allocation. I guess it has worldwide significance.

It is going to take a while to program this radio. There is no word on programming software. Check out these bright ideas:

I used the one-touch channels for my favorite TV, AM and FM stations.

The "Hyper Memory" feature is similar to Kenwood's programmable memory mode set. You can set up for varying operating conditions, and instantly recall the entire radio setup. I programmed several, including one for daylight use, and one for nighttime use that reduces the brightness of the display, and the (busy receive status) strobe.

The multi-colored, user selectable strobe can even be used in low light situations as a built-in-light if you need to do paperwork. It could even be used as an emergency flashlight. Battery staying power will vary.

I found that the PTT button was used to "save and exit" many menu settings although the manual does not always document this procedure.

I also found the V/M key can stop scanning from the VFO, Memory or Weather (WX) modes and return to regular mode with just that one key press.

Like all Yaesu products, when they tell you to briefly, or momentarily press a key, they mean VERY quickly. You need the lightest and quickest tap you can master. It is the difference between success and frustration in programming.

The VX-7R even has a clock function. It can be programmed to wake you up to music or turn itself off at bedtime.

Overall, I found the new VX-7R to be easier to program and navigate through the settings than the VX-5R. OK, it does not trunk, but I still give it five stars!

77

Attention hams! I have looked everywhere to find a source for those "T" connectors used on virtually all mobile ham radios these days. I hated to spend \$12

bucks just to get a new connector with the black/red wires. I found a source that sells just the connectors. I am now the happy owner of several new home-brewed power cables so my mobiles can be quickly connected to other power sources and situations. Try <http://www.PowerWerx.com> or 1-714-570-3303. They sell a package of 10 connectors for \$19.90. (You just need the male plugs) They also sell Anderson Power Plugs (\$20 for 25 sets of AMP connectors) and various sizes of wire etc. Anderson has become the standard ARES/RACES connector in many areas. Check out <http://www.andersonpower.com>, and <http://www.races.net/sca/powrpole.html>

78

Do you own an older Icom handheld radio in the SAT series? I do. More than one, actually. Well, it seems they have an internal watch type rechargeable battery. If it becomes exhausted, the display will not alert and the radio appears dead. Here is a tip from the Icom webpage. Connect the radio to an external power source, and turn the power on while holding down the Function button. It will reactivate the battery. That saved me a few dollars, and a trip to the repair center.

79

Last month I was surfing the net and stumbled upon Stewart Aviation. Try <http://www.stewart-aviation.co.uk/rs/index.html>. The UK seems to be quite obsessed with aircraft, airshows, and monitoring the aero frequencies. The company started out going to airshows, and then by natural extension began selling monitoring radios. They have several wide coverage scanners for those who need the 225-400 MHz aircraft frequencies. I bought a scanner and received three FREE booklets:

The Frequency UK Spectrum Guide
Shortwave Frequencies
Military and Civilian Aircraft Frequencies

They also sent an illustrated catalog with many pages of military patches, pins, aircraft scanners and accessories. Any serious patch collector will be overwhelmed by their selection. As an interesting side note, I see where the US military has a huge presence in the UK, and there are even special concessions to our military frequency allocations in the 142 and 406-410 MHz ranges. Hams enjoy only 144-146 MHz, while emergency services have allocations in the 146-148 MHz range.

80

Several years ago, there was a company that sold the "Tiger Tail." It was nothing more than a length of wire that fit around the BNC connection to form a counterpoise

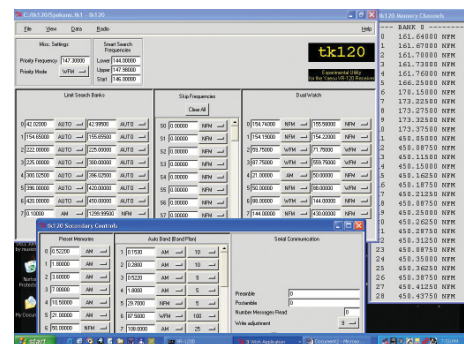
(ground radial). The VHF/2 meter version was about 18 inches long. You can make your own real cheap. In a jewelry hobby shop, look for a roll of wire called (suspiciously) "Tiger Tail." It is simply nylon-coated stainless steel. It comes in various lengths. You can also use it as stealth antennae for shortwave up through UHF, length cut to resonance, of course. Careful where you use this; its invisibility is also a hazard that could injure someone if not placed in a secure and safe manner.

81

You can't believe everything you read on the 'net. While commercial sites are usually reliable, mailing and special interest groups (e.g., Pro 782XLF users group list) can have some very bad advice as well as good tips. If the reply starts out, "Well I have never owned a Pro 782, but my cousin borrowed one for a couple of days and he said..." Yeah, right, I could really trust that source. You also find people that have only purchased the radio yesterday, but talk as though they are the resident guru on the subject. Go back and read your Owner's Manual a couple of times. Become your own resident expert.

82

As I write this, there are some great buys on the Yaesu 120 receiver/scanner. Dealers are unloading their current inventory to make room for the new 120D. The only improvement on the new "D" unit is a DC power jack. With 640 memory channels and many outstanding features, this is a real bargain. Free programming software is available courtesy the programming talent of fellow MT columnist Bob Parnass (see p.80). He also has programs for the Yaesu 500, Icom R75, NRD 545, and Icom 8500. His download page can be found at <http://www.parnass.org>



Ft Lauderdale Air and Sea Show

The South Florida contingent of monitors were out in force for the annual Fort Lauderdale Air and Sea Show. Now in its eight year, the show is held directly on the beach and features air and marine performers. Unlike other airshows, “show center” is composed of buoys in the Atlantic Ocean instead of runway intersections at local airports.

On the beach, thousands of spectators watched from the water’s edge, nearby hotels, condominium buildings, beachside cafés and restaurants. Out in the Atlantic, beyond the restricted area buoys, thousands more watched from small boats, sport-fishing vessels and million-dollar yachts.

Each viewing area is unique in terms of radio use and perspective toward the show. Beachgoers saw an amphibious assault by US Marines and watched parachute teams such as the Golden Knights and Leap Frogs hit their targets dead-on. Event management channels were in constant operation to satisfy the needs of event patrons, VIPs, vendors and suppliers. News media reporters and camera crews were on site with audio and video production channels, live feeds, and wireless microphones.

Boaters got to see an actual amphibious deployment from Navy ships anchored nearby, plus close-in flyby’s for the crews of Fleet Week support ships and a visiting aircraft carrier. Marine channels, shipboard radio systems, discrete restricted-airspace frequencies and even a VHF-Low Band channel were found by local hobbyists.

Meanwhile, across town at Fort Lauderdale-Hollywood International Airport, many of the participating aircraft and aircrews were staged for the show. In use were air traffic control frequencies, discrete squadron channels, fueling and maintenance channels, plus a variety of local government allocations.

Rounding out the radio mix throughout the show area were lifeguard, transit, sanitation, and private security channels.

Lois Berkes, Executive Director of Tri-County, Inc. of Cape Coral, Florida, supplied the rental radios and frequency coordination for event management and administration. The frequency guru was the late Jim Ried, Founder and President of Tri-County. Those associated with the airshow acknowledge Mr. Ried as the technical genius behind the show’s communication system, and thus, the show’s safety and success for many years. Mr. Ried passed away shortly after the event.

Planning for the show’s communication



system begins about eight months in advance. Fifteen channels were utilized for event management in 2002, encompassing twelve temporary repeaters for such diverse functions as Air Ops, Marine Ops, Fleet Week at Port Everglades, Hospitality, Media, Security, Catering and related services. Each had their own channel during the two-week series of festivities. In all, over 400 VHF and UHF radios were distributed to workers.

“We cover a large (geographic) area and we just couldn’t do it without radios,” acknowledged Elaine Fitzgerald, President and CEO of Fitzgerald Productions, Inc., the airshow’s public relations firm.

Specific elements of the event included the National Military Appreciation Month, McDonald’s National Salute to the Military, Fleet Week, the taping of CBS Television’s “Rockin’ for the USA” special, and the McDonald’s Air and Sea Show. Highlights of the Air and Sea Show are scheduled for ESPN broadcast on Sunday, August 4th. Check your local listings.



Photo credit: Mark Longo

Due to security concerns, the frequency channel plan used for the event is considered proprietary by event managers. The show includes many Fortune 500 corporate leaders, politicians, military personnel and local volunteers. The FCC, FAA, military, other government agencies and private industry representatives all contribute to the final channel plan. Additionally, many months are spent in the planning of radio assignments and avoidance of local interference and intermodulation...always a challenge in a heavily-populated, urban environment.

While event managers know that such frequencies can be found by hobbyists, and are in fact in the public domain, they nevertheless must maintain their own contractual obligations to promoters, sponsors and participants by withholding any “official” communications plans. Frequencies listed in Table 1 were found through monitoring, and I suspect that many more channels were actually in use during the course of the event.

♦ Who’s Listening: Jim Westberg

“The world around you is what you see, but with a scanner, you start getting a feel for the greater world around you.”

These philosophical words are brought to us by Jim Westberg, a Senior Supply Chain Analyst for an international health care firm.

“Scanners open your mind to what goes on behind the scenes in the outside world. This is a view of the inner workings of society, not the superficial junk we are normally exposed to. With a scanner, you can visualize what’s happening out on the street. It makes you question how things work, and how people do their jobs. I use a scanner to better understand the places I’m in.”

Jim’s first scanner was a Pro-2009, 8-channel desktop model, received when he was 12 years old. “I immediately fell in love with the hobby,” Jim recalled. He bought *Police Call* to find frequencies for La Grange, Illinois, outside of Chicago, and scanning became a daily hobby for him as he was growing up. “There was a day...I literally just got up in the morning and spent the whole day just scanning. I was a hermit that day. I eventually had to go downstairs to eat...I was getting sick!”

Jim quickly became a seasoned signal catcher, with several different antennas in his home’s attic and outside his room. He rigged one antenna with string and metal brackets on the roof. It still rocked back and forth, looked awful, but brought in some new

signals. "Whatever it took to get a better signal, I would do it. I'd string wires between trees, rig antennas in odd places, do whatever it took to get that last ounce of signal."

He regularly listened to police and railroad channels. The Indiana Harbor Belt and Burlington Northern railroads were regular catches. "I'm from a railroad town, so that was important," Jim said. "With the windows open in the summer, the 119 was the freight [train] that came in from out west. I could hear it coming, and also hear it communicating with the switchyards."

Jim began exploring the various bands and learning how agencies operated. "I remember searching in UHF. 460.4 came up with Chicago PD during the search...it was super busy...our town was relatively quiet." After logging his local agencies, Jim's scanner accompanied him on treks to his family's summer home in Lake Geneva, Wisconsin. "I packed up the scanner and brought it to the lake in summer. I started picking up marine radio, Lake Geneva PD, and other things I hadn't heard before."

The diversity of communications became an interest for Jim which continues to this day. He listened to Driver's Ed training at the local high school, security guards, drive-thru restaurants, police, fire and many other channels in his town.

"I got into amateur radio at age 16...scanning got me into amateur radio. It was mindblowing to get into amateur radio and be able to talk around the world. The hams are into scanning as well, so there are common things to talk about. I listened to the Space Shuttle downlinks all the time."

Jim had some lean scanning years while in college, but later rediscovered the hobby during his postgraduate years. The scanner was a constant companion when he moved into his first apartment in Chicago. "Living in the city, there's always something going on with police and fire channels."

Other diversions got in the way of scanning again until last year. Jim rediscovered his scanner and the enjoyment it brought when he could hear the Space Shuttle and local agencies. But, technology had changed the spectrum. Most of his favorite VHF and UHF channels were quiet, replaced over the years by 800 MHz trunked systems. "The hobby bit again. I just felt out of touch...felt out of the loop and out of the hobby. My old scanner had no 800 MHz coverage."

After much research and financial number-crunching, Jim recently purchased an Icom IC-Q7A. The Icom brochure best summarizes Jim's decision toward this radio:

"Ultra compact 2 meter/440 MHz dual band handheld with full feature scanner. Extra easy to use. The new IC-Q7A is great for ANY ham! Get Higher Performance in a Pocket Size Dual Bander. MORE wideband reception. Hear what you've been missing. With receive frequency coverage of 30 to 1300 MHz (US cellular phone band blocked), you'll get more police, fire, aircraft, and other wireless communications. Dimensions: 2.3 (W), 3.75 (H), 1.1 (D) inches, 6 oz (0.375 lb)"

Although this unit does not follow trunked communications, Jim believes it's a good compromise. "I can talk on two ham bands and listen to everything else. I get enough of the trunked channels to follow what's going on."

Just as his childhood scanning promoted an



Photo credit: Mark Longo

interest in amateur radio, so, too, did amateur radio promote his interest toward international business. As an adult, Jim has traveled, worked, communicated and scanned in areas across the U.S. and Central America. In Costa Rica, for example, Jim practiced his Spanish by monitoring the local police and taxi cabs.

A sentimental side is also apparent. On trips back to the old neighborhood, where some VHF channels are still used, Jim savors the simple visual delight of seeing his old frequencies. "It's nice to see the old numbers up on the screen...154.25, 155.07, 155.37...that's part of my childhood. It's definitely a part of what makes me...me."

Jim concluded, "So many good things have come from a hobby that let me listen to the world. Radio in general is just a real good thing. You also learn a few technical things along the way. You not only tune into the radio, you tune into the things around you."

Thanks, Jim, for your down-to-Earth comments, insight, and wonderful validation of the scanning hobby.

◆ Bank Number One: Las Vegas

From Bill Rogers: "...thought I might pass this info along about the Las Vegas Metropolitan Police Department. Via their website, they have a scanner function where you can listen to live audio from their radio system. They also have a listing of their codes and other interesting items for radio monitors."

Thanks, Bill, for the tip. The Las Vegas PD website page is truly unique among municipal agencies. Not only can you listen to an audio feed of the radio system, but an extensive explanation is given for the communications traffic you'll hear.

The site lists radio signal codes, administrative codes, incident disposition codes, area commands and channel numbers, and the phonetic alphabet.

Those of you in Las Vegas, or traveling there this summer, will find this to be a great companion to your Bank One list of local frequencies. The website link appears in our Links of Interest.

Links of interest from this column:

Fort Lauderdale Air & Sea Show:

<http://www.airseashow.com>

Icom IC-Q7A:

<http://www.icomamerica.com/>

Las Vegas Metropolitan Police Department:

http://www.lvmpd.com/video_audio/scanner.htm

Table 1: Air & Sea Show

CIVILIAN FREQUENCIES

including marine band and Coast Guard

119.300	Fort Lauderdale-Hollywood Intl Airport, tower
119.700	Miami Approach for Fort Lauderdale-Hollywood Intl Airport
120.200	Fort Lauderdale-Hollywood Intl Airport, tower
121.700	Fort Lauderdale-Hollywood Intl Airport, ground
121.825	Aerobatic performers air-to-ground
122.825	Aerobatic performers air-to-ground
122.850	Aerobatic performers air-to-air
123.025	Helicopter coordination air-to-air
123.075	Helicopter coordination air-to-air
123.100	Coast Guard SAR Demo
123.150	Aerobatic performers air-to-ground to public address system
123.475	Golden Knights
132.900	Air Boss VHF
157.175	Coast Guard range safety ops
151.1150	Unid. show vendor/concessionaire
151.4000	VIP tent
151.4300	VIP tent
461.6875	Fort Lauderdale Jet Center (staging area for aircraft)
462.3875	Show Administration (main show operations, VIP's, etc.)
464.6750	Galleria Mall security (spectator parking and staging area)

Plus local government trunked systems of City of Fort Lauderdale and Broward County, Florida, various marine channels, news media frequencies and FRS radios.

MILITARY FREQUENCIES

Land mobile

GATOR OPS amphibious assault exercise 30.4

USS Truman EDACS trunked system			
(Fleet Week at Port Everglades, Florida)			
406.125	408.125	408.7	409.2
409.8	418.8	419.0	419.525
419.6	419.9		

Additional unidentified shipboard channels from Fleet Week (mostly trunked system inputs and outputs):

406.35	406.65	406.85	406.875
407.65	408.45	408.5	408.975
409.425	410.025	411.975	412.475
414.15	416.275	416.475	416.6
418.025			

Parachute Teams

123.475	US Army Golden Knights air-to-ground
407.500	US Navy Leap Frogs air-to-ground

Blue Angels

238.15 Blue Angels
263.35 Blue Angels
275.35 Blue Angels
345.90 Blue Angels

Demonstrations/Show Control

251.90 USAF Rescue Demo
255.50 USAF Rescue Demo
258.60 Unidentified
277.80 Navy common
303.00 A-10 Demo
345.80 Air Boss UHF
358.10 Unidentified
381.80 Coast Guard demo
391.75 USS Truman working Nighthawk in controlled airspace (F-117)

LOCAL AIR TRAFFIC CONTROL

251.10 Miami Departure for Fort Lauderdale-Hollywood Intl Airport
257.80 Fort Lauderdale-Hollywood Intl Airport, tower
269.30 Miami Center
285.60 Miami Approach for Fort Lauderdale-Hollywood Intl Airport
306.30 Miami Approach for Fort Lauderdale-Hollywood Intl Airport
313.90 Fort Lauderdale-Hollywood Intl Airport, tower
317.70 Miami Approach for Homestead Air Reserve Base
348.70 Miami Center
353.60 Miami Center
380.20 Miami Approach for Fort Lauderdale-Hollywood Intl Airport
387.10 Palm Beach Intl Airport, departure control

FEDERAL FREQUENCIES

409.0 DMAT Florida Team FL-5

Credits for frequency list: Allan Stern, Jan Fine, Kenji-D, Bote

Scanning the Mounties

Scanning Canada's flying tour of our nation lands at the easternmost city in North America this month – St Johns, Newfoundland. I have flown in and out of St Johns a couple of times in recent years. The airport is a modest, but busy hub serving the capital city of Canada's newest province (Newfoundland and Labrador joined the Canadian confederation in 1949). St Johns is also world famous as the site of Signal Hill where Guglielmo Marconi received the first transatlantic radio signal (sent from Cornwall in the United Kingdom) in December 1901.

Signal Hill was a beautiful site on the clear, sunny day when I walked from downtown to the cliff top overlooking the Atlantic Ocean (St Johns is often shrouded in fog, so I guess I got lucky). Of course I brought my scanner with me and monitored taxis working in the city down below, air traffic control at the airport, and fishing and Coast Guard vessels returning from the ocean. The airport frequencies are listed below and of course the fishing vessels can be heard on the regular marine band frequencies. *Scanning Canada* will examine the Canadian Coast Guard in detail in a later column.

Monitoring St Johns International Airport, Newfoundland

Table 1: Airport Communications

Radio: 122.5, 126.7
Automatic Terminal Information Service: 128.0, 293.8
Ground: 121.9, 275.8
Tower: 120.6, 236.6
Mandatory Frequency: 120.6
Peripheral Station: (Gander Centre) 133.15, 227.3

Table 2: Navigation Beacons:

VHF Omnidirectional Range Test facility (VOT): 114.8
VHF Omnidirectional Range (VOR)/Distance Measuring Equipment (DME): "YYT" 113.5 (located at 47 29 07N, 52 51 08W)
Tactical Air Navigation (TACAN): "UYT" 108.6 (located at 47 37 38N, 52 44 53W)
Instrument Landing System (ILS):
"IYT" 109.5 (runway 16-34)
"ISO" 110.3 (runway 29)
"IMP" 109.1 (runway 11)

The Royal Canadian Mounted Police

MT reader Michael Rochon of Windsor, Ontario, wrote to *Scanning Canada* about his passion for the Royal Canadian Mounted Police. Michael's father is a retired "Mountie" so he is very well acquainted with the history and the traditions of Canada's world famous police force. Michael provided the following information and frequency list.

The first RCMP 2-way radio system began operating in 1939 in Winnipeg, Manitoba, using the callsign VY8T to communicate with patrol cars and detachments. Earlier communication methods used HF radio and even commercial broadcast stations to relay messages at prearranged times to officers in the field. By 1946 the system was installed throughout large parts of western Canada. Within a couple more years the system had spread east to Quebec.

During the ensuing years various system upgrades were implemented and in 1971 a new telecommunications initiative resulted in a computerized dispatch system being installed in British Columbia. The 1970s also saw the introduction of new voice privacy systems with cryptic names like OBOE, BRAUN and DES. You may be able to monitor the mounties' frequencies, but a lot of the voice traffic is now encrypted. Some frequencies use CTCSS tones – 110.9, 123.0, 131.8, 136.5, 146.2 are typical.

Table 3: RCMP Frequencies

Band A:
421.0125 421.0375 421.0625 421.0875 421.1125 421.1375
421.1625 421.1875 421.2125 421.2375 421.2625 421.2875
421.3125 421.3375 421.3625 421.3875 421.4125 421.4375
421.4625 421.4875 421.5125 421.5375 421.5625 421.5875

421.6125 421.6375 421.6625 421.6875 421.7125 421.7375
421.7625 421.7875 421.8125 421.8375 421.8625 421.8875
421.9125 421.9375 421.9625 421.9875 422.0125 422.0375
422.0625 422.0875 422.1125 422.1375 422.1625 422.6875
422.7125 422.7375 422.7625 422.7875 422.8125 422.8375
422.8625 422.8875 422.9125 422.9375 422.9625 422.9875
423.0125 423.0375 423.0625 423.0875

Band B:

421.0250 421.0500 421.0750 421.1000 421.1250 421.1500
421.1750 421.2000 421.2250 421.2500 421.2750 421.3000
421.3250 421.3500 421.3750 421.4000 421.4250 421.4500
421.4750 421.5000 421.5250 421.5500 421.5750 421.6000
421.6250 421.6500 421.675 421.7000 421.7250 421.7500
421.7750 421.8000 421.8250 421.8500 421.8750 421.9000
421.9250 421.9500 421.9750 422.0000 422.0250 422.0500
422.0750 422.1000 422.1250 422.1500 422.1750 422.7000
422.7250 422.7500 422.7750 422.8000 422.8250 422.8500
422.8750 422.9000 422.9250 422.9500 422.9750 423.0000
423.0250 423.0500 423.0750 423.1000

Simplex channels can be found 4 or 5 MHz higher than the Band A and B frequencies.

RCMP Airport Security Detail Channels:

[A1] 413.2875 [A2] 413.0625 [A3] 410.9875 [A4] 414.5875
[A5] 410.4125 [A6] 418.0625 (simplex) [A7] 410.0125 (simplex)
[A8] 415.5375 (simplex) [A9] 410.3125 (simplex)

Toronto Pearson International Airport Channels:

[1] 857.6375 [2] 857.8875 [3] 859.3875 [4] 859.6375
[5] 859.8875

Mansfield VORTAC

This month's picture shows a detailed view of a VORTAC (VHF Omnidirectional Range/Tactical Air Navigation) beacon located near Mansfield in Ontario (latitude 44 08 36N, longitude 80 08 48N). "MANS" is used by traffic on a profile descent to Pearson Airport in Toronto.

This beacon can be heard on 114.5 MHz repeating its callsign "YMS" in slow Morse Code. While driving by the field where the beacon is located I noticed that the gate on the access driveway was open. I parked up, grabbed my new Canon Powershot and a couple of minutes later your intrepid Canadian columnist had a good close-up picture of the beacon.

73 and see you all in September when we head up to the Arctic Circle to scan the airways and airwaves at the top of the world.

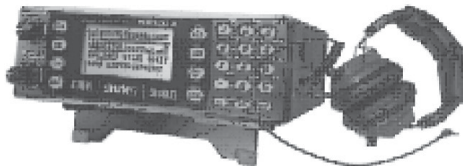


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Bearcat 278CLT 100 ch. AM/FM/SAME WX alert scanner.....	\$159.95
Bearcat 245XLT 300 ch. TrunkTracker II handheld scanner.....	\$189.95
Bearcat 248CLT 50 ch. base AM/FM/weather alert scanner.....	\$89.95
Bearcat Sportcat 200 alpha handheld sports scanner.....	\$169.95
Bearcat Sportcat 180B handheld sports scanner.....	\$149.95
Bearcat 80XLT 50 channel handheld scanner.....	\$99.95
Bearcat 60XLT 30 channel handheld scanner.....	\$74.95
Bearcat BCT7 information mobile scanner.....	\$139.95
AOR AR8200 Mark II Wide Band handheld scanner.....	\$539.95
AOR AR16BQ Wide Band scanner with quick charger.....	\$209.95
ICOM PCR1000 computer communications receiver.....	\$379.95
ICOM R10 handheld wideband communications receiver.....	\$279.95
ICOM R3 handheld wideband receiver with video display.....	\$379.95
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Russian Channel Markers: Now They're Talking

Ever since the 1960s, the shortwave (high frequency, or HF) spectrum has been populated with weird little marker beacons that spend nearly all their time repeating a single letter in Morse code, over and over. These use continuous-wave Morse telegraphy (CW), or sometimes frequency-shift keying (FSK). They come from all over Russia, and their purpose has never been completely understood.

These have been called, among other things, SLBs (Single-Letter Beacons), and SLHFM's (Single-Letter HF Markers). ENIGMA 2000, the European "numbers" group, has issued them the code MX, which one also sees quite often.

◆ Cluster Beacons

Clusters are just that. Anywhere from three to five little stations, spaced only a few tenths of a kilohertz (kHz) apart, repeat one letter each, forever and ever. With a wide filter, you hear them all, at different pitches. A narrow CW filter picks them out one at a time.

Presumably each letter is from a different, widely separated site. They do not fade in or out at the same times, and periodically one letter will vanish from all frequencies, to come back months or years later. They tend to simulcast on several bands at once. Frequencies change regularly, but locations don't.

The clusters are probably used for navigation, though they could also be propagation beacons. Even if they aren't for propagation, plenty of radio listeners use them for that purpose.

◆ Solitary Markers

Far more interesting, though, are the lonely, single beacons. These are really channel markers used by the Russian military, usually the Navy. They keep the frequencies open. Current locations are Moscow ("C"), Vladivostok ("F"), Kamchatskiy ("K"), St. Petersburg ("L"), Kaliningrad ("P"), Arkhangelsk ("S"), and Uzbekistan ("V").

We know these are markers as opposed to navigational beacons because sometimes the CW letter will stop and real traffic will appear, usually digital or radioteletype (RTTY).

If you are really, really lucky, though, you might even hear voice messages on the "R" marker. This one is currently suspected to be in Izhevsk, a river port 600 miles east of Moscow, in a region that has long been associated

with military production. It's best heard in northern Europe.

Except for an occasional "M" from Magadan, "R" is different from all the others. It's in upper-sideband (USB), and the Morse letter is from an 800-hertz audio tone. It sounds the same as CW, but this system allows speech without changing mode.

These rare voice messages usually happen at 0000 hours Moscow time. They often come from "41." Sometimes he's calling out to "Rotor-35," presumably a control station.

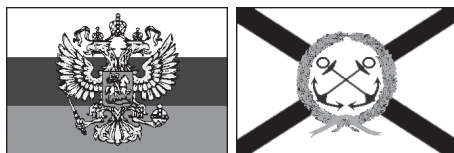
The check-ins appear to be growing more frequent, coming every few weeks instead of every few years. This would seem to indicate either increased military activity in Asia, or just increased use of this transmitter. On April 1, the following terse exchange (translated from Russian) was heard in Norway:

"Reskript [copy?] 22 80 39 90. Reskript 22 80 39 90. This is Borets-41 [Warrior-41], Moscow time is 00 hours, over"

Last May, the following was heard, also in Norway:

"I am Plavets-41 [Swimmer-41]. Reskript: 22, 80, 39, 90. Reskript: 22, 80, 39, 90. Moscow time - 0 hours. Over."

While voice is increasing on "R," it is still one of the rarest catches in this hobby. Those who might want to bag this rare bird can try 3195, 3322, 4325, 4558, 5154, 5465, 6390, 7452, 7550, and 25250 kHz, all USB. Moscow is three hours ahead of coordinated universal time, so midnight comes at 2100 UTC.



Russian Navy flags: The double eagle is for when the President is aboard, and the anchors are for the chief of staff.

◆ Australian Utility Changes

On July first, several utility radio changes took place in Australia. First is that the weather facsimile broadcasts (FAX) were moved from the Navy transmitters AXM and AXI to a new HF network operated by the government Bureau of Meteorology (BoM). The new stations are VMC, Weather East, at Charleville in Queensland, and VMW, Weather West, in

Wiluna, Western Australia.

VMC takes over from AXM on the same frequencies, which are 2628 (local night), 5100, 11030, 13920, and 20469 (day). VMW replaces AXI on new frequencies of 5755 (night), 7535, 10555, 15615, and 18060 (day). In both cases, the broadcast schedule (continuous) and machine settings (120/576) remain the same.

The full schedule of specific charts and times is available at http://www.bom.gov.au/nmoc/rad_sch/axm_sched.shtml.

The new BoM stations have also replaced the USB voice weather bulletins, which used to come from coastal stations operated by Telstra, the Australian phone company. VMC local daytime frequencies are 4426, 8176, 12365, and 16546. Night frequencies are 2201, 6507, 8176, and 12635. VMW day frequencies are 4149, 8113, 12356, and 16528. Night frequencies are 2056, 6230, 8113, and 12356.

The full schedule of specific voice bulletins and times is at http://www.bom.gov.au/marine/voice_services.shtml.

Users have been warned that the reception characteristics of the new stations will differ from the old ones. The new transmitters are in different locations, both fairly well inland. This positioning may be to eliminate skip zones. Then again, maybe not.

Finally, VNG is off the air, again, as of midnight on 30 June. This government standard time and frequency station was widely used, but it had chronic funding problems, putting VNG on and off the air with depressing regularity.

For now at least, it's gone again, unplugged due to what was called, in perfect bureaucratese, "obsolescent technology." This most likely translates as, "Shortwave? I didn't know that still existed. Euwwwww, how embarrassing." Various less embarrassing options are under study, including use of "the radio-pager network." Huh?

VNG broadcast time pips and voice announcements. It had a rather odd frequency plan. The usual international time station allocations of 2500 and 5000 kHz were used, but added to those were two borrowed Navy transmitters on 8638 and 12984 kHz. Oddest of all was the 16000 kHz, which broadcast only half the day, meaning that you had to know what time it was before you knew if the time station was on the air.

Regardless of all this weirdness, goodbye VNG. Hope to hear you again someday.

ABBREVIATIONS USED IN THIS COLUMN

AFB	Air Force Base
ALE	Automatic Link Establishment
AM	Amplitude Modulation
ARQ	Automatic Repeat Request teleprinting system
AUTODIN	Automatic Digital Network
AX.25	Amateur data-packet telecomm system
CAMSLANT	Communication Area Master Station, Atlantic
CW	Morse code telegraphy ("Continuous Wave")
DEA	Drug Enforcement Administration
DX	Distant Transmitter
E10	Israeli phonetic female, null message format
EAM	Emergency Action Message
FAX	Radiofacsimile
FEC	Forward Error Correction teleprinting system
FEMA	Federal Emergency Management Agency
FGS	Federal German Ship
GHFS	Global High-Frequency System
HFDL	High-Frequency Data Link (air digital system)
LSB	Lower Sideband
MARS	Military Affiliate Radio System
Meteo	Meteorological
MFA	Ministry of Foreign Affairs
MFSK	Multitone Frequency-Shift Keying
NATO	North Atlantic Treaty Organization
NAWS	Notice to Allied War Ships
NECN	National Emergency Coordination Net
Pactor	Packet Teleprinting Over Radio
RSA	Republic of South Africa
RTTY	Radio Teletype
SITOR-A	Simplex Teleprinting Over Radio, ARQ mode
SITOR-B	Simplex Teleprinting Over Radio, FEC mode
SS	Steam Ship
UK	United Kingdom
Unid	Unidentified
US	United States
VOLMET	Aviation Weather broadcast

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations (encrypted, usually unidentified, broadcasts thought to be intelligence-related) are identified in () with their ENIGMA station designators, as issued by the European Numbers Intelligence Gathering and Monitoring Association.

- 68.0 GBY20-UK Navy, welcoming Swedish submarine *Halland*, then back to "NAWS" markers every 2 minutes, at 0730. (Day Watson-UK)
- 122.3 Unid-Dutch Navy, working a vessel in exercise Sorbet Royal 2002 in RTTY, at 1955. (Watson-UK) *Submariners went out an underwater escape hatch to simulate a rescue in this triennial exercise. -Hugh]*
- 141.4 Unid-Dutch Navy, working a vessel in exercise Sorbet Royal 2002 in RTTY, at 2000. (Watson-UK)
- 3850.0 Muenche-German Federal Police, Munich, sounding in ALE at 2033 and 2232. Berlin-German Federal Police, Berlin, sounding in ALE at 2204. (Watson-UK)
- 4372.0 "9-T-X"-US Navy, in Link-11 coordination net with "9-W-Y" and "U-9-L," at 0247. (Ron Perron-MD)
- 4537.5 Berlin-German Federal Police, Berlin, ALE sounds at 2004, 2104, and 2204. Muenche, sounding at 2132 and 2232. (Watson-UK)
- 4601.5 OA-Irish Navy, Haulbowline, with SITOR-A chatter and coded message for a vessel, at 1352. (Watson-UK)
- 4879.5 Berlin-German Federal Police, ALE sounds at 2003, 2103, and 2204. Muenche, sounding at 2032, 2132, and 2231. (Watson-UK)
- 5022.5 Muenchen-German Federal Police or Ministry of Interior, ALE sounding at 1830. (Patrice Privat-France)

- 5120.0 OWK-Danish Air Force, Vedbaek, calling OWP in ALE, at 2004. (Watson-UK)
- 5255.5 Irish Navy, Haulbowline, working a vessel in SITOR-A, at 1857. (Watson-UK)
- 5696.0 Rescue 1500-US Coast Guard, over disabled sailing vessel, at 0122. (Rick Baker-OH) Coast Guard 1716, telling CAMSLANT Chesapeake, VA, of departure from Guantanamo Bay, at 0214. (Perron-MD) Rescue 2133-US Coast Guard Falcon jet, working CAMSLANT in a search at 0555. (Allan Stern-FL) *[For whatever reason, we're having way more Coast Guard search-and-rescues than usual. -Hugh]*
- 5841.0 Panther-US DEA, Bahamas, working Coast Guard 62A at 0109. (Perron-MD)
- 6271.5 KECW-Restored World War II freighter *SS Lane Victory*, underway off southern California, working KPH, CA, with special event CW messages, at 1500. (Hugh Stegman-CA)
- 6407.7 ZSD/ZSJ-South African Navy, in MFSK, at 1038. (Bob Hall-RSA)
- 6428.0 ABC-Israeli intelligence (E10), with abnormal, multi-frequency callup, repeated for hours after 1600. (Ary Boender-Netherlands)
- 6477.5 KPH-Maritime Radio Museum, Pt. Reyes, CA, working vessel KECW (*SS Lane Victory*) with special messages in CW, at 1500. (Stegman-CA)
- 6694.0 Rescue 74-Canadian Forces, in patch to Halifax Rescue via Halifax Military, BC, in a search at 0458. (Jeff Haverlah-TX)
- 6697.0 Elegant-US Air Force, with a 28-character EAM, simulcast on 8992 and 11244, at 0507. (Haverlah-TX)
- 6757.0 Windmill-US military, with a 28-character EAM, simulcast on 6697, 8992, and 11244, at 0308. (Haverlah-TX)
- 6890.0 Berlin-German Federal Police, ALE sounds at 2003, 2103, and 2203. Muenche, sounding at 2031, 2131, and 2230. (Watson-UK)
- 7597.0 Muenche-German Federal Police, Munich, ALE sound at 2030, 2130. (Watson-UK)
- 7611.0 FAADCA-Federal Aviation Administration, Washington, DC, calling FAAASO (Fort Worth, TX) in ALE-initiated voice contact, also identified as KEM80, at 0125. (Mid-Atlantic DXer, MD)
- 8132.0 Berlin-German Federal Police, ALE sounding at 1701. (Privat-France)
- 8433.0 RRR34-Moscow Radio, with CW markers; new frequency or a mistake, at 1508. (Watson-UK)
- 8443.5 DHJ61-German Navy, Flensburg Muerwik, with a special Naval Signal School 100th anniversary CW broadcast, also on 12410, at 1500. (Watson-UK)
- 8861.0 Dakar-Air route control, Senegal, working Argentina 1141, at 2354. (Perron-MD)
- 8912.0 CS1-US Customs Service, with ALE sound at 2204. (Watson-UK)
- 8942.0 007-Arinc HFDL, Shannon, Ireland, squitter at 2230. LH8265-Lufthansa aircraft with position in HFDL, at 2230. (Watson-UK)
- 8971.0 Bluestar-US Navy, Puerto Rico, working Omni 06, a drug interdiction aircraft temporarily re-tasked for a Coast Guard search and rescue near Dominica, at 2330. (Stern-FL)
- 8983.0 Coast Guard Rescue 6032-US Coast Guard helicopter, working CAMSLANT Chesapeake in a Caribbean search, at 0140. Rescue 1706, a C-130 out of FL, working CAMSLANT on a search south of Cuba, at 0427. Rescue 6001, helicopter, enroute to the search for a person in water from a ship sinking in Chesapeake Bay, at 2050. Rescue 1706, above a rescue near Bermuda, at 2330. (Stern-FL)
- 8992.0 Goose 71-US Air Force, in patch via Puerto Rico to Hurlburt Meteo, FL, at 0200. Coco 11, patch via Offutt to Hurlburt, went to 11175, at 0235. (Perron-MD)
- 9027.0 Populate-US Air Force, came from 9270, calling Andrews to try the data test again (4th frequency change), apparently no joy in heavy interference, at 1508 and 1515. (Haverlah-TX)
- 9057.0 Piano Key-US military, with a 28-character EAM, simulcast on 8992 and 11244, at 1600. (Haverlah-TX)
- 9080.0 TS2-Israeli Air Force, sounding in ALE at 2049. (Watson-UK)
- 9122.7 AL17-Possibly Albania; and SK13, Slovakia; with 2BS5, in the Combined Endeavour 2002 AX.25 computer "packet" network, at 0530. 2BS5-Possible Belgian military, in the AX.25 packet net with PL51, Poland; AT53, Austria; and GW4, at 1700.

- (Privat-France) 6NF4-Combined Endeavour 2002 exercise net, Belgium, working 2BS5 (control) in AX.25 packet, at 1626. (Watson-UK) ["Packet radio" refers to the "data packets" sent over the air in this computer-based mode. This NATO exercise was also heard/copied on 6985.7, 8168.7, 10657.2, 11103.2, 12166.2, 13464.7, 14748.2, and 20717.7. -Hugh]
- 9185.0 UK10-Combined Endeavour 2002, location unknown, working MK16, also unknown, using voice to attempt packet setup. Went to 9970, got walloped by an out-of-band AM broadcast in French, then back to 9185. (Watson-UK) [Oops. -Hugh]
- 9227.0 AA1-Possible Israeli Air Force, ALE sounds at 1905, 1933, 2005, and 2034. (Watson-UK)
- 9270.0 Populate-US Air Force, called Andrews on the wrong frequency given by the Andy op, then went to 9027 (the right one), at 1507. (Haverlah-TX)
- 9360.0 OXT-Copenhagen Meteo, Denmark, with a FAX ice chart, at 1249. (Watson-UK)
- 10204.0 Meredith-US military, with a 28-character EAM, simulcast on 8992 and 11244, at 1937. (Haverlah-TX)
- 10206.0 DRAF-German Navy destroyer FGS Molders, working DHJ58 (Glucksburg), at 0147. (Perron-MD)
- 10272.5 Berlin-German Federal Police, ALE sounds at 2102 and 2202. Muenche, sounding at 2029, 2129, and 2229. (Watson-UK)
- 10416.0 LN2A-Propagation beacon, Seivo, Norway with bursts and CW identifier at 1915. (Watson-UK)
- 10493.0 AFA10I-US Air Force MARS, assisting WGY 912 (FEMA, Mt. Weather, VA), taking check-ins for the quarterly NECN exercise, at 1357. WGY 908, FEMA Region 8, Denver, CO, alternate control in the NECN drill, LSB, taking many check-ins. WGY 912 simultaneously operating on USB, at 1417. (Haverlah-TX)
- 10658.0 1090-Red Crescent, sounding in ALE at 1937. (Watson-UK)
- 10875.0 BMLV2-Austrian military, possibly Balkan peacekeeping, sounding in ALE at 0704. (Privat-France)
- 11175.0 Death 15-US Air Force, working Hickam GHFS, went to 15016, at 0226. (Haverlah-TX) Coco 11-US Air Force, patch via Puerto Rico to Seminole Ops, FL, came from 8992, at 0237. (Perron-MD) Offutt-US Air Force Offutt GHFS, NE, answering a Mainsail call at 2336. (Harold Frogde-MI)
- 11181.0 Griswald-US Military, possible command post aircraft, with a 28-character EAM, simulcast on 10204, at 1620. (Haverlah-TX)
- 11184.0 AY2161-Finnair, position in HFDL at 1446. (Watson-UK)
- 11186.0 Keep Track-US military, working Polar Bear 801, at 0111. (Perron-MD)
- 11205.0 Architect-UK Royal Air Force Flight Watch Center, with continuous VOLMET at 2300. (Perron-MD)
- 11220.0 Populate-US Air Force, came from 11175 for Andrews, moved to 11460 which they called "295," at 1428. (Haverlah-TX)
- 11232.0 Trenton Military-Canadian Forces, passing coded traffic with Razor 22, at 1826. (Frodge-MI)
- 11235.0 443-Unknown aircraft, possibly Spanish Air Force, working an unid ground station, which sent them to frequencies B4A and B5, at 2307. (Perron-MD)
- 11244.0 Dumpling-US military, calling Mainsail (any ground station), no joy, at 1956. (Haverlah-TX)
- 11279.0 Arctic Radio-North Atlantic air traffic control, working KLM 9195, at 2338. (Perron-MD)
- 11288.0 Saudia Operations-Saudi Airlines, running a patch from an unid aircraft in Arabic, at 0203. (Perron-MD)
- 11460.0 Populate-US Air Force, came from 11220 for Andrews, tried an AUTODIN inject [data network connection -Hugh], no joy, so the Andy op sent him to 9270, corrected himself to 9027, but too late, at 1434. (Haverlah-TX)
- 12178.0 DRDQ-German Navy submarine, calling DHJ59 (headquarters), no joy, at 0120. (Perron-MD)
- 13155.0 Legal Fee-US military, with a 28-character EAM, simulcast on 8992 and 11244, at 1937. (Haverlah-TX)
- 13215.0 AF6-US Air Force Distinguished Visitor aircraft, sounding in ALE at 1526. (Privat-France)
- 13215.0 GUA-US Air Force, Anderson AFB, Guam, ALE sounding at 1900. AED-Elmendorf AFB, AK, ALE sounding at 1926. (Privat-France)
- 13354.0 San Francisco-Air route control with Hawaiian 12, at 0253. (Perron-MD)
- 13882.5 DDK6-Hamburg Meteo, with weather FAX at 1600. (Watson-UK)
- 13907.0 CVS1-US Customs Service, ALE sound at 1118. CS9, sounding at 1140. (Watson-UK)
- 13985.0 AIR-US Air Force MARS headquarters station, MD, working hams in the annual Armed Forces Day crossband tests, at 0024. (MADX-MD)
- 14360.0 BGD-Slovakian Embassy, Baghdad, Iraq, ALE sounding at 1105, 1445, and 1554. (Privat-France)
- 14373.4 TAKO-Missionary order, Takoradi, Ghana, with Pactor-I personal messages in Spanish, at 1650. (Hall-RSA)
- 14567.0 WGY 908-FEMA, Denver, CO, working WGY 980, AK, in LSB for the quarterly NECN drill, at 1735. (Haverlah-TX)
- 14814.0 IS1-UK military or diplomatic, Islamabad, Pakistan, ALE sound at 1716. KUW, Kuwait, sounding at 2227. (Watson-UK)
- 16223.7 Unid-Egyptian MFA, Cairo, with a long ARQ news broadcast in Arabic, at 1747. Cairo, with coded message to Boustane, Paris, Brussels, and Moscow, at 1800. (Hall-RSA)
- 16223.7 kdakrfr-Egyptian MFA, Cairo, with a long ARQ message in Arabic to all embassies, at 1700. (Hall-RSA)
- 16256.7 kdlist-Egyptian MFA, Cairo, with a long ARQ message in Arabic to all embassies, at 1544. (Hall-RSA)
- 16260.0 RFGW-French MFA, Paris, with an encrypted embassy circular in FEC, at 1526. (Hall-RSA)
- 16386.7 Unid-Pakistan MFA, Islamabad, encrypted traffic with Stockholm Embassy, at 1838. (Watson-UK)
- 16386.7 Unid-Pakistan MFA, Islamabad, with an urgent coded ARQ message to all embassies, at 1756. (Hall-RSA)
- 16706.5 UCOO-Russian vessel Mekhanik Brilin, working UCE, Arkhangelsk, in ARQ at 1200. UCE-Vessel Pioneer Litvy, working UCE in ARQ at 1230. (Privat-France)
- 16707.5 UIRU-Russian vessel Sormovskii 3054, working RRR, Moscow, in ARQ at 0930. UBMT-Vessel Bratislava, working RRR in ARQ at 0945. (Privat-France)
- 16914.5 SPB83-Szczecin Radio, Poland, with Miss Universe results in Polish, FEC at 1606. (Hall-RSA)
- 17147.0 URL-Sevastopol Radio, Ukraine, with CW markers at 1715. (Hall-RSA)
- 17484.0 CCM-Chile Navy, with a coded RTTY message at 1230. (Hall-RSA)
- 18945.0 S97-Swedish embassy, Abidjan, sounding in ALE at 1454. (Hall-RSA)
- 19554.0 055-Unknown station in East Asian net, sounding in ALE at 1729. 172-E. Asian net, sounding in ALE at 1827. (Watson-UK)
- 19977.0 KUW-UK military, Kuwait, sounding in ALE at 1541. DKL-UK military, Dhekelia, sounding at 1814. PRI-UK military, Pristina, sounding at 1824. (Watson-UK)
- 20942.0 S97-Swedish embassy, Abidjan, calling S00 (Stockholm) in ALE, at 0849. (Hall-RSA)
- 20990.0 BGD-Slovakian Embassy, Baghdad, Iraq, ALE sounding at 1059, 1108, 1200, then an ALE-initiated data exchange with Bratislava MFA, at 1416. (Watson-UK)
- 22475.5 PWZ33-Brazilian Navy, Rio de Janeiro, with encrypted RTTY ship movement list at 2014. (Watson-UK)
- 22537.0 FUF-French Navy, Ft. de France, usual RTTY test loops at 2031. (Watson-UK)
- 23214.0 PR1-US Customs Service, ALE sounding at 1217, 1302, 1646, 1730, and 1817. D43-US Customs, sounding at 1639 and 1810. (Watson-UK)
- 23522.9 JMH6-Tokyo Meteo, with weather FAX at 0940. (Watson-UK)
- 23526.0 S92-Swedish Embassy, Managua, Nicaragua, ALE sounding at 1200 and 1251. Unknown Swedish diplomatic, with an ALE-initiated data exchange at 1558. S93, Havana, calling unknown station in ALE at 1621 and 1624. (Watson-UK)
- 24370.0 RFGW-French MFA, Paris, with FEC markers at 1650. (Hall-RSA)
- 25186.0 KUW-UK military, Kuwait, with ALE-initiated voice contact, at 0746. (Hall-RSA)

New PacTOR Mode

This month we take a look at the new PacTOR offering from SCS, examine a 1280bps Offset QPSK system from Russia and the oft-heard NATO encrypted RTTY links.

❖ PacTOR-III

As if to point out the increasing pace of change in HF modem technology, barely a few years have passed since the introduction of PacTOR-II and we're now presented with the third generation of this popular mode.

PacTOR-III employs a number of sub-modes which the maker (SCS) calls "speedlevels." Each speedlevel basically varies the number of 100bd 8PSK parallel tones as follows:

SpeedLevel	Tones	Effective Data Rate (bps)
1	2	77
2	6	247
3	14	589
4	14	1186
5	16	2039
6	18	2722

Effective data rates of up to 5200bps are possible if compression is taken into account. The modem is able to change speedlevels automatically according to prevailing conditions. Each tone is spaced 200Hz and, at the highest speedlevel, the entire signal covers a full 2.4kHz of spectrum. The selcal mechanism is preserved to ensure compatibility with PacTOR-I and II modems but on connection, the modems negotiate with each other to determine the most effective mode to use. New hardware is not required since the new mode is an upgrade to current modem firmware.

However, as you've no doubt noticed from the specifications of this new version of the system, PacTOR-III exhibits another trend as HF modem data rates increase – namely an increase in bandwidth. Since both PacTOR-I and II (200Hz and 500Hz bandwidth respectively) are both heavily used within the amateur radio community where bandwidth is often at a premium, this trend has not gone unnoticed. Consequently, there is somewhat of a concerted effort underway at present to discourage the use of PacTOR-III on the HF amateur bands.

It remains to be seen just how quickly the mode catches on with the traditional users of PacTOR – aid organizations, and HF email and internet access providers. One such organization, the coastal radio station DAO in Kiel, Germany, is already offering the new modem in its lineup of supported systems for HF email and internet access.

❖ Russian 1280bps PSK

Most evenings, propagation allowing, tune your radio to 6832 kHz and you'll hear the distinctive rushing "white noise" sound of a Russian PSK system. The system is thought to have replaced the old long distance 300bd RTTY teleprinter links in the early 1990s since the disappearance of the old system coincided with the appearance of the new one.

The PSK system in use is offset QPSK (4PSK) using serial tones with a data rate of 1280bps. The system appears to exist in two configurations. In the first scheme (as is the case on 6832 kHz) a single channel is placed on the upper sideband with center offset by .081 kHz from a kilohertz or half kilohertz point. In the second scheme, two channels are paired, centers spaced by 4.151 kHz with the second channel offset by 0.93 kHz. A two-channel version can often be heard on 6774.93 and 6779.08kHz or 13361.93 and 13366.08 kHz.

At least 20 frequencies have been known to be in simultaneous use. These signals are easy to dismiss as noise, so take a listen to this interesting signal – you may have passed it by without even noticing!

❖ NATO KG84 encrypted RTTY

It's quite likely that you've seen a question posted in your favorite utility newsgroup or mailing list that goes something like this:

"I'm copying a very strong RTTY signal on 12345 kHz. It measures as 75bd with a shift of 850Hz and although it's a perfect signal I get nothing but gibberish. Is my decoder broken? Can someone please help?"

Perhaps you've experienced the same problem? Well, welcome to the wonderful world of the NATO encrypted (the official designation for the crypto scheme is KG84) RTTY links. You can still find them just about anywhere,

and at anytime, despite the fact that many are being replaced by the STANAG4285 2400bd HF modem. They come in the following common varieties:

Speed	Shift	Example Frequency
75bd	850Hz	12120kHz
100bd	850Hz	8486kHz
110bd	110Hz	13952kHz
110bd	170Hz	10341kHz
150bd	850Hz	16045kHz

Another common configuration is 300bd with 300Hz tone shift which can usually be heard on a number of early morning frequencies in use by Australian Forces. These signals share a distinctive offset of .86kHz. Try 13439.86 and 14600.86kHz for examples.

Since many of these links are in fact permanent broadcasts, and many frequencies carry the same transmission. For example, the 75bd/850Hz link on 12120kHz is also carried on 16264kHz. These transmissions can easily be recognized by ear as they switch between idle and message phases, since the idling condition is simply to send a repeated "1010101" sequence, commonly called reversals. Viewed with a Baudot decoder, the reversals show as a sequence of "RY" characters.

Apart from the obvious gibberish that you'll see if you try to decode these pseudo-random transmissions, more sophisticated examination can show a little more tell-tale information. For example, as the transmission switches from the idle reversals to the message, a twice repeated 256bit header block, probably containing the encryption key is sent. This shows up as a spike at ACF=64 when viewing the signal with an autocorrelation module. Baudot equipment will show the characters "VMGTCNJBH" as the header ends.

See if you can spot one of these transmissions when you next listen.

That's it for this month. 73 and good DX.

Resources

SCS PacTOR-III -
www.scs-ptc.com/pactor3.html
PacTOR-III Clip -
rover.vistecprivat.de/~signals/WAV/PACTOR-III.WAV
Kiel Radio EMail -
www.kielradio.de/GB/Start_GB.htm
1280bps PSK Clip -
rover.vistecprivat.de/~signals/WAV/CIS1280.WAV
NATO RTTY Clips -
rover.vistecprivat.de/~signals/WAV/LINK14.HTML

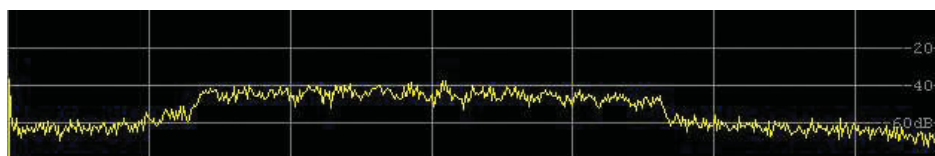


Figure 1: PacTOR-III 14 Tone Spectrum

Radio Afghanistan Back, in a Roundabout Way

It started in late May as an unidentified on 18940 between 1400 and 1700 UT playing the same musical bit over and over, heard by Noel Green, UK and José Valdés, Venezuela. Then Erik Koie of Radio Denmark revealed that some of his own station's broadcasts in this time period on other frequencies were being dropped by the Kvitsoy, Norway transmitter, as called for in a Merlin agreement, should it find other clients. From May 31 Valdés found 18940 starting regular programming. So did Green from the next day, with recitations and "Afghan" type programming booming in, stronger than before. Kai Ludwig, Germany, pointed out that plans had been announced previously for programs originating at the revived R. Afghanistan, Kabul, to be satellite-fed abroad for SW broadcast back to Afghanistan, where adequate domestic transmission facilities were still lacking.

Koie then informed that Merlin has a 4-month contract with Norkring, which runs the Norwegian transmitters, for broadcasts to Afghanistan. Björn Fransson, Gotland, heard a clear ID at 1600 as

"Radio Afghanistan." The Bulgarian *Observer* reported 18940 as 500 kW, 95 degrees in Pashto and Dari. Anker Petersen of DSWCI in Denmark notes that there is also a morning broadcast at 0200-0359 on 15240, probably via Al Dyabbaya, UAE, another Merlin-operated facility. Do not confuse this operation with the London-based exile R. Voice of Afghanistan on 17870 via Austria at 1330-1430; with the U.S.-backed R. Free Afghanistan; or 8700 PsyOps Information Radio.

By mid-June, *Observer* reported that the schedule had expanded to: 0100-0557 on 15240 UAE, 500 kW 45 degrees (but co-channel R. Australia is also on in English), and 1230-1727 on 18940, Kvitsoy, 500 kW, 95 degrees.

Perhaps by October, Afghanistan will have high-power MW and even SW facilities within the country and this roundabout way of serving a domestic audience will no longer be necessary. We only hope all Afghan radios feature the 18 MHz band!

ALASKA KNLS English at 1300 on 11565 from 16 May ex-11870 (via Alan Pennington, BDXC-UK) Too much WEWN QRM de 11875?

ARGENTINA R. Baluarte or R. Maranatha, 6215v is by all indications a pirate. None of its frequencies on AM, FM or SW are licensed in the countries where it operates, Argentina, Brazil and Paraguay. I monitored 6215 one evening, and heard Portuguese with lots of mistakes at 0245 (Célio Romais, Brasil, @atividade DX) R. Baluarte told me by phone that their SW schedule is *1000-0300* with 1 kW. Actually monitored at *0956 and 0301*. Physical address is Hipólito Yrigoyen esquina Andresito, 3370-Puerto Iguazú, Misiones, Argentina (Gabriel Iván Barrera, Argentina, Conexión Digital) Announced postal address at sign-on: Radio Baluarte, Casilla de Correo 45, 3370 Puerto Iguazú, Prov. de Misiones, Argentina (Nicolás Eramo, Argentina, DX Listening Digest) A religious pirate, speaking 'portuñol' (Gabriel Iván Barrera, Argentina, RN Radio-Enlace) E-mail QSL in Spanish received from Ana María Spieker Eidinger, missionary at station, icnfuturo@hotmail.com giving names and ages of all her children (Jan-Erik Österholm, dxing.info)

R. Rivadavia, 20276-LSB, 0140-0320+, Spanish phone talk. Many IDs; and on 29810-LSB, at 1227-1300+, IDs and soccer game (Brian Alexander, PA, DXLD) Station has declared bankruptcy; interested in buying it are Iglesia del Reino Universal de Dios de Brasil, and ESPN, as it already carries a lot of sports (<http://www.deradios.com> via Nicolás Eramo, Conexión Digital)

ARMENIA Yerevan heard in Armenian at 1610-1641* on 11685 which is not in their own schedule, but registered for 1600-1700, 500 kW, 305 degrees (Noel R. Green, UK, BC-DX)

AUSTRIA Tomorrow's highlights from Radio Austria are on their website, http://roi.orf.at/english/en_report.asp (Richard Cuff, swprograms)

BOLIVIA New on 6883 is Bartolina Sisa Radio, religious program in Aymara at 0945-1010; named for the heroine of the liberation of the Quechua-Aymara nation. Last December, Rogildo F. Aragão reported on this frequency Rdif. Impacto Cristiano, La Paz (Samuel Cássio, DX Clube do Brazil)

BRAZIL R. Educação Rural, Tefé, Amazonas is struggling to survive against difficulties of running a station in the tropical forest. It's part of the Rede Católica de Rádio. But when it is on the air, 1000-1500 and 2000-0200, most of the programming on 3385 is local (Célio Romais, @atividade DX)

BURMA [non] Democratic Voice of Burma via DTK Jülich, Germany, 2330-0030 on 9490 100 kW, 80 degrees (Observer, Bulgaria) According to IBB monitoring, Democratic Voice of Burma at 1430-1530 is also scheduled on 9500 replacing 15620 via Rangitaiki, NZ (Wolfgang Büschel, Germany, BC-DX)

CANADA Scott Snailham, the former and final verie-signer for CHNX, 6130, Halifax, says the SW transmitter was scrapped, a victim of the bottom line mentality in commercial radio today. If it doesn't generate revenue, then it's a waste, and thus not worth doing. A shame really, as it existed since 1930 in one form or another (via Ian B., ARDXC)

The labor dispute which disrupted the broadcasts of Radio Canada International since March 22 has finally been settled. RCI news bulletins resumed May 25, and normal programming gradually returned (Maggy Akerblom, RCI) Statement by members of the union negotiation committee from <http://www.ssrc.qc.ca/sections.php>. RCI and CBC Northern personnel did not get the protection other members of the union got (Wojtek Gwiazda, on Radio Freedom, V. of the Employees of the CBC, Radio Libre webcast)

CHILE R. Parinacota has been reactivated on 6010, heard relaying R. Cooperativa at 0754-0810 mentioning website <http://www.cooperativa.cl> (Gabriel Iván Barrera, Argentina, Conexión Digital)

Voz Cristiana deleted 11690, reduced 21550 from 1300-0100 to only 1300-1400 (Observer, Bulgaria)

Scamusica, tentative, 47900-FM, Santiago, at 2340, nonstop instrumental music, no announcement. This is a background music radio (Hideki Watanabe, Saitama, Japan, Radio Nuevo Mundo)

CHINA 6060, Voice of the Golden Bridge, Xichang, Sichuan (nominal 5900) heard regularly from fade-in 1040 past 1300 in Tibetan, Chinese and another dialect. Sometimes plays Tibetan native music. ID in English (!) on the full hour (Roland Schulze, Philippines, DSWCI DX Mirror) See also TIBET!

COLOMBIA A SW frequency has been reactivated, 6064.5, originally R. Súper, and then Colmundo, but now heard testing in the daytime with llanera folk music, never a positive ID, and transmission breaks of 30-35 minutes. Also repeated a single religious program, *Dios en Familia*. From that I got the name of a bookstore in Bogotá, Colombia para Cristo, where I found out the following. Colmundo sold the station to another evangelical organization and the transmitter has been moved to Puerto Lleras in Meta department, some two hours from Villavicencio; they also have MW, HJV82 on 1530, which I can hear in the early morning when the channel is clear. The latter is called Alcaravan Radio, named for a bird of the eastern plains. After testing, they plan separate programming on SW (Rafael Rodríguez, Colombia, Conexión Digital) On 6064.55, Sistema Radial de Alcarabanga, simulcasting MW, at 0120-0245* and from *1100 (Björn Malm, Ecuador, SW Bulletin)

Radio Súper, Cali at 1000 going from religious program to local ID on 4799.70, fourth harmonic of 1199.92. Nice signal (Björn Malm, Ecuador, SW Bulletin)

COSTA RICA Lest you think the University Network here is really called TIDGS, we made up those call letters long ago as a convenient way to refer to the station. Dr. Gene Scott is in the process of upgrading the Cahuita site with a new 100 kW transmitter on order, antennas acquired from HCJB, and several new frequencies are planned, with the object of putting a good signal into Europe (Glenn Hauser, DX Listening Digest) Scott has finally revealed what Secret Number Fifteen is. He got 700 people to pledge \$10,000 each, above their regular tithes, a total of \$7 million due by Xmas, and he got the first million within one month. He wouldn't say what this money would be used for (Robert Arthur, DX Listening Digest)

CUBA Background of two RHC English-language announcers: Simon Wollers (an alias) is a former San Francisco travel agent, a foreign true believer who opted for a life in Havana and a monthly salary of about \$150 (not including food rations and a state-assigned apartment). He worked with Salvadoran union activists in the '80s. Another American at RHC is Langston Wright (a.k.a. Michael Finney). A member of the black militant Republic of New Afrika (RNA), Finney was involved in a 1971 New Mexico shootout that left a state trooper dead. Although the FBI

remains unable to apprehend Finney (he's one of 77 Americans granted asylum by Dr. Castro), they can at least hear his soothing tenor delivering the latest news bulletins on their radio every night (Our Man In Havana, by Brett Sokol, Wall Street Journal via Daniel Say, swprograms)

CZECH REPUBLIC R. Prague now publishes some advance programming details at <http://www.radio.cz/en> (Alan Roe, UK, swprograms)

*All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2x freq = 2nd harmonic; A-02=summer season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated*

DENMARK [non] R. Denmark schedule is available by auto-reply; send empty email to: schedule@dr.dk (Erik Koie, DR Radio)

ETHIOPIA Off-frequency talking around 1330 on 9561.4 probably R. Ethiopia, as previously reported by Hashimoto, *Japan Premium* (gh, OK) Radio Ethiopia on 9560 is seriously unstable, always on the high side of nominal, as high as 9562.2. Their other 9 MHz channel (nominal 9705) is also off, though stable on 9704.2 (Chris Greenway, Kenya, *DX Listening Digest*)

[non] Clandestines via DTK, Jülich, Germany, 100 kW:

Voice of Democratic Path of Ethiopia Amharic:
0700-0800 21550 145 Sun Eaf Amharic
1830-1930 15565 145 Wed Eaf Amharic

Radio Rainbow:

0800-0900 6180 ND Sat Eu Amharic
0800-0900 15410 ND Sat Eu Amharic [experimental]
1900-2000 15565 145 Fri Eaf Amharic

Voice of Democratic Eritrea:

1400-1500 5925 ND Sat Eu Tigrina
1700-1800 15670 125 Mon, Thu Eaf Tigrina

Tigrean International Solidarity for Justice and Democracy:

1600-1630 15530 125 Wed, Sat Eaf Tigrina

Voice of Ethiopian Salvation:

1600-1700 15530 125 Thu, Sun Eaf Amharic

Radio Huriyo:

1630-1700 15530 125 Tue, Fri Eaf Somali

Voice of Oromo Liberation

1700-1730 15670 125 Wed, Fri, Sun Eaf Oromo
1730-1800 15670 125 Wed, Fri, Sun Eaf Amharic

(Ivo and Angel! Observer, Bulgaria)

FINLAND R. Finland will end foreign service broadcasts on SW in English, German and French. Some foreign language programming will, however, continue to be broadcast locally for the domestic audience, the Finnish Broadcasting Company (YLE) announced June 12. While trying to cut costs, YLE will maintain a shortwave service in Finnish and Swedish to serve license fee payers traveling abroad. Company sources say that Russian will continue to be heard at least on the AM band, in Northern Europe. English, German and French are bound to end when current schedule expires on October 27. Cutbacks are part of a development plan approved by YLE Administrative Council to guide operations in 2003-2005. Official decisions to confirm the proposed measures are expected in late August (*DXing.info*)

This is a proposal, and as always there might be interference from the government or politicians in general, so there's still a bit of hope. Time once again to write off to a station. In this case you should put pressure on the director of the Yleis radio department. His name is Seppo Härkönen, and the address is PL 100; 00024 Yleisradio, Finland (Frans Vossen, *RVi Radio World* via John Norfolk) We should take the time to let Radio Finland's people know that we want this valuable service of Finnish news and views to be retained, and that time to let your opinions be known is NOW! (Joe Hanlon in Philadelphia, *DX Listening Digest*)

Scandinavian Weekend Radio's monthly 24-hour broadcasts are on the first Saturday, i.e. Aug. 3, Sept. 7, etc., actually from *2100 UT the Friday before, but in addition, a special EDXC-meeting broadcast on Aug. 17. One transmitter switches between 11690 and 11720; another among 6170, 5980 and 5990. Check website for latest schedule: <http://www.swradio.net> (Dj. Madman, SWR) In June a clear window with good conditions allowed SWR to be heard at 0030-0130 on 11720 (David Hodgson, TN, *DX Listening Digest*)

GREECE [and non] V. of Greece via USA 1200-1500 on 11730 ex-9590. As long as VOG has access to VOA transmitters [in USA], I doubt they will ever unpack those donated 250 kW transmitters [in Greece]. It must be cheaper to burn American electricity than deplete the Greek supply? 0000-0400 on 5865 and 9420 from Kavala, 15630 and 7477 from Avlis. 0600-0800 Delano is 15190; Kavala on 17520, 21530; Avlis on 15630 and 9420 switching to 17900 at 0700. ERA Interprogram *Orientations*, 30 minutes daily in foreign languages includes 1830-1900 English on 12105. Additional English: 0930-0950 daily 15630, 17900, news bulletin; 1600-1700 Sat *Hellenes Around the World*, 1800-1900 Sun *It's All Greek to Me*, both on 9420, 15630, and Delano 17705 (John Babbis, Silver Spring MD, *DX Listening Digest*)

Parliament's Public Order and Justice Committee approved by majority vote agreement between the U.S. and Greek government to extend operation of Radio Free Europe and Voice of America for another six years. Voting against the agreement were the Communist Party of Greece (KKE) and the Coalition of the Left and Progress (*Synaspismos*) who termed it "politically unacceptable." (Xinhua via COMTEX via Kim Elliott)

GREENLAND KNR [Kalaallit Nunaata Radioa] is back on SW. Daily news is on 3812-usb with 100 Watts at 1330-1430 and 2000-2200 UT when DST is observed, one hour later in winter. Transmissions are unofficial but quite regularly heard, especially during summer. Site is Tasiliq on the east coast, and reports indicate this can be monitored on the west coast. "Real" SW may start again. For some ten years, authorities have been considering closing down the current five 5-10 kW MW transmitters. Very few listen to them as all inhabited areas are now covered with FM, and audio quality is poor: in Greenland they utilize the same very narrow bandwidth of 4.5 kHz as in Denmark. Besides, electricity is very expensive in Greenland. These five MW may be replaced with one SW on the island of Cook, not far from Nuuk. That would be a more efficient way to serve fishermen who are the only ones still listening to AM. Cook Island was also the site of the old SW transmitters of KNR on 3999, 5980 and 9575 several years ago. When, or if, a new official SW station in Greenland happens, a frequency in the 3-5 MHz spectrum is likely (Stig Hartvig Nielsen, *DX Listening Digest*) DXing 3812 may become possible as we fall into winter (gh) KNR website <http://www.knr.gl/> had nothing about new SW broadcasts (Mika Mäkeläinen, Finland, *dxing.info*)

IRAN State radio launched a daily broadcast in Hebrew aimed at countering what Iran sees as "the monopoly of one-sided news" coverage. Voice of David is aimed at Middle Eastern Jews, mostly in Israel, nightly during the half hour before midnight. The broadcasts will not be heard by the largest Jewish community in the Middle East outside Israel – the 25,000 Jews who live in Iran itself. The move is partly a response to Israel radio's broadcasts in Farsi (*TIME's World Watch Newsletter*, via Johan Berglund) That would be 1900-1930 UT on 9745 and 7175, previously testing in English as the "Ebri service." As much chutzpah as R. Marti

(gh) Sounds like a spoof of the old "Voice of Bob" pirate: <http://www.msnbc.com/news/765750.asp> (Harry Helms, *DX Listening Digest*)

[non] Voice of Iran, Persian clandestine via Issoudun, France: 1530-1730 on 17510 (Ivo and Angel! Observer, Bulgaria)

ITALY IRRS-Shortwave reduced SW schedule to Sat and Sun 0800-1200 on 13840. See <http://www.nexus.org/NEXUS-IBA/Schedules> (Ron, NEXUS, swpirates egrop via Mike Terry) So dropped 3985 and 7120, but is 13840 really from Milan? (gh) NEXUS website mentions previous test of 13840 last December "from a transmitter located outside Italy. Information on exact location and technical characteristics of this will not be available for public disclosure at this time." 13840 is also registered at later hours for use by DTK from Jülich and Wertachtal, Germany. Hmmm (Kai Ludwig, Germany, *DX Listening Digest*) IRRS also carried a 5-day special in June, R. Gap, from Genova, on 13864.5v (Mika Mäkeläinen, *dxing.info*: Dave Kenny, Mark Hattam, BDXC-UK) But surely DTK would not be several hundred Hz off frequency, unless they were "really" trying to deceive us. Sounds like another TDP client. Bulgaria, anyone? (Glenn Hauser, *DX Listening Digest*) IRRS on 13840.1 is extremely strong here (Observer, Bulgaria)

KASHMIR [and non] To monitor the current conflict, from the Pakistani side, Azad Kashmir Radio is at 1430-1700 on 4790, only in Urdu and Kashmiri; V. of Jammu & Kashmir Freedom, 1300-1430, on 5101 including very interesting political commentary in English at 1400. India's official station, R. Kashmir, Srinagar, 4950, 1300-1740* (Victor Goonetilleke, Sri Lanka, *RKI Multiwave Feedback*)

KOREA NORTH Voice of Korea to Eu on new 15245v at 1300-2356, clashing with Sweden, VOA, RFE/RL and Iran until 1900; English hours are 1300, 1500, 1900, 2100 \ 13760 (Observer, Bulgaria)

KOREA SOUTH [non] 6715-USB, Korean mystery station: not audible here in South Korea, so I conclude that it is not coming from FE Asian continent. Likely from a country that adopts DST in the vicinity of Europe (Sung Chul Cho, *DXing.info*) Direction finding indicates it is along this Great Circle from Europe: 224 and 044 degrees, Canary Islands, Argentina/Chile, Wellington, New Zealand, Seoul, Irkutsk. 19-21 UT suggests an audience in W Europe and on the Korean Fishing fleet in the C&S Atlantic, and maybe Brazil? (Wolfgang Büschel, BC-DX) On a Friday at 2145, church service in Korean, piano music, hallelujahs, amens, long spell of talking tongues, off at 2230, no ID, SIO 333 (Alan Pennington, Caversham, BDXC-UK *Communication*) I sent a 45 minute recording of 6715 USB to Korean DXer Sung. C. Cho of Seoul. He replied: "The religious program on 6715U is produced by a part of Yoido Full Gospel Church in Seoul. The pastor is Yong Gi Cho. He is known to many Korean Christians. I will ask him why his church is aired on 6715U" (David Hodgson, TN, *DX Listening Digest*) Here in Singapore, churches spell his name as Cho Yong Gi (Richard Lam, Cumbre) Found a website for this church, <http://english.fgtv.com/default.asp> (Hans Johnson, Cumbre DX) Nothing on site about 6715 (gh)

MOROCCO Medi Un, 9575, has some great music – the best rock mixed with Moroccan music, and more: jazz, French chansons, and even Brazilian music. One evening there was music of João Gilberto in his voice and as recorded by singers from other countries. Listen on Sundays from 2100, or every day, and avoid the idiocy which prevails on Brazilian stations! (Célio Romais, Brasil, *@vidade DX*)

NEPAL QSL cards have arrived from R. Nepal: one after almost a sesquieyear. Verification form was created by laser printer, but the card's surface is too smooth, so some letters dropped off (Dmitri Mezin, Kazan, Russia, *Signal*) After a semiyear, full data card, though the stamp had been stolen and most of the print had flaked off – you should see it! (Johan Berglund, Sweden, *hard-core-dx*)

NEW ZEALAND R. Ferryhead, Christchurch, licensed on 1413 kHz was heard relayed on 7145 at 0532, a low powered operation. There is a history of illegal re-broadcasts from Christchurch. I rang Radio Ferryhead and they knew nothing of this (Paul Ormandy, Oamaru, New Zealand, *DX Listening Digest*)

RNZI sometimes reaches its target so well on 17675 that it cuts power from 100 to 50 kW (NZ DX Times) See also BURMA

NICARAGUA HTA, R. Universidad, Managua, is on 9905 SW with 1000 watts, and FM 102.3, 19 hours per day (*Catholic Radio in the Americas*) ?? something very new, or very, very old? Or imaginary? (gh) I do not know where that information came from, but I thought it suspicious. Maybe they were given an old transmitter and put it on the air (Mike Dorner, *Catholic Radio Update*)

NIGERIA [non] Salama Radio on 15250 with strong signal and afro pop music and announcements around 1930. Where is this station from and who is backing it? (Tom Sliva, NY Adirondacks, *DX Listening Digest*) Harvestime Ministries, PO Box 126, Chessington, Surrey, KT9 2WJ, UK. <http://www.salamaradio.org> tells all they want to say about it, not including transmitter site, but it is through Merlin (gh)

OMAN Radio Sultanate of Oman via Thumrait 100 kW, 220 degrees: 1400-1500 English and 1500-1800 Arabic on new 13725 ex-15140 (Ivo and Angel! Observer, Bulgaria)

PERU New on 4678.86, ID as Radio Paz Perú Internacional or variants of that, from Chiclayo, at 0155. Says email-address as radiopaz@terra.com.pe Peruvian music, both secular and Christian. Schedule seems 2300-0300 (Björn Malm, Ecuador, *Shortwave Bulletin*)

Radio Santa Rosa is new on 5122.07, from unknown location, at 2335; testing, closing at 0000 or 0100. My guess is the Santa Rosa, in la provincia de Jaén, el departamento de Cajamarca.

On 5384.30, Radio Huarmaca, at 0240-0321* announcing tests, folk music. Not clear if it is related to previous stations of same name on other frequencies (Björn Malm, Ecuador, *SW Bulletin*) On 5384.2, R. Huarmaca, 0030-0106* with praise music, address as Jirón 9 de Octubre No. 110 (Rafael Rodríguez R., Colombia, *Conexión Digital*)

Radio Santa Rosa, Lima, 6045.4, very nice folk music at 1012-1025 and commentary about first Tawantinsuyo emperor (Arnaldo Slaen, Argentina)

CPN Radio back on 6150, good at 0557, telephone interview, string of IDs (Paul Ormandy, Oamaru, New Zealand)

R. Tacna reactivated 9504.8 in June to broadcast World Cup certain days at 1130; also heard from 1100 in contact with R. Libertad, covering civil disturbances in Arequipa, "Ciudad Blanca" (Arnaldo Slaen, Argentina)

PHILIPPINES R. Veritas Asia, 250 kW via Palauig, frequency changes include 15360 for Tagalog 1500-1525 (Mon/Tue/Thu/Sat - 1555), 300 degrees. Also 2230-2255 on 15240, 30 deg (Ivo and Angel! Observer, Bulgaria) No English per se from RVA, except for continuity announcements, and perhaps segments within Tagalog (gh)

Shortwave Broadcasting

PORTUGAL RDP's new 300 kW Thales transmitter, and new high-gain curtain antennas, began in June on this schedule: Eu, 52°, M-F: 0500-0755 9840; 0800-1200 11960; 1600-1900 (may extend till 2300), 15525; Sat & Sun: 0700-1345 13640; 1400-2000 15555. Brazil, 215°, M-F only: 2300-0200 Tu-Sa 15295. Furthermore, a new computer-controlled antenna matrix is being installed. Modulation quality was deficient (Carlos Gonçalves, Portugal, *DX Listening Digest*) RDP, 13700, on 13535 and 13865, at 0037, a couple of very distorted symmetrical spurs 165 kHz above and below the fundamental (David Hodgson, Nashville, TN, *DXLD*)

QATAR A-02 schedule for Radio Qatar in Arabic, only one frequency, replacing 9570.2, on 17755.2 at 0245-2130, but it clashes with 17755.0 stations: 1000-1100 China Radio International in Cantonese, 1400-1500 Radio Japan NHK World in English, 1500-2100 Radio Exterior de España in Spanish, 2100-2130 Voice of America in French, M-F (Ivo and Angel! Observer, Bulgaria) 17755.25, extremely weak, peaks around 1100 (Tony Rogers, BDXC-UK)

RUSSIA Radiostation Atlantika (via coastal outlet Murmansk Radio) has moved from 17266 to 17302 SSB, a special program from Murmansk for seamen and fishermen, heard at 0800 (Ruslan Slavutsky, near Moscow, MIDX in "RUS-DX" via Anatoly Klepov, Signal) Reception quality very poor. Nearby 17299 is occupied by Radio Sevastopol'-5, which causes sideband interference (Konstantin Gusev, Moscow, MIDX via Signal)

Two main reasons for SSB broadcasts these days: Either intended for ships, and/or on former jamming transmitters. 11840 Sakhalin is listed with 20 kW, typical power for a former jammer. These were usually utility transmitters designed for SSB, modified for AM when jamming stopped, but do not perform well in this mode. Unless used in SSB on purpose, they often radiate stronger on one sideband (Bernd Trutenau, Lithuania, *Dxplorer* via DSWCI DX Window)

SAINT HELENA Once Saints had regained full British citizenship, R. St. Helena got around to QSLing over 700 reports for its final SW broadcast on 23 Oct 1999. Among the first to report receiving theirs were: (Kurt Brandstetter, Austria, swl; Wendel Craighead, Prairie Village, KS; Phil KO6BB Atchley, swl; Nicolás Eramo, Argentina)

SWAN ISLAND A 1962 Radio Américas QSL card sold on eBay for \$358.52! I believe the seller was in New Zealand. Item # 2107511331. The coded identifier of the purchaser is "thefang". I looked at his ebay history and he has been buying a lot of QSLs and paying surprisingly large prices for some of them (Patrick Griffith, CO) thefang is a ham in Phoenix involved in DXpeditions. Has spent more than \$10,000 on eBay, apparently for adrenalin rush of purchasing items at last minute, often spoiling hopes of lower bidders. Also paid more than \$345 for four ham QSLs from Swan (Dario Monferini, Italy, *DX Listening Digest*)

SWEDEN Radio Sweden has added weekly quarter-hours in two new languages, actually from the domestic Immigrant Languages service and webcasts: 1600-1615 on 13850, Arabic on Sat, Kurdish on Sun (SCDX/MediaScan)

TIBET Tibet People's Broadcasting Station, Lhasa, 6130, heard with English program 1628-1638 about Tibetan Buddhism. Another day at 1630, "Welcome to Holy Tibet" (Christer Brunström, Halmstad, Sweden, *SW Bulletin*) Not an external service, but for English speaking foreign tourists in Tibet (Richard Lam, Singapore, *DX Listening Digest*) Also heard on 9490 at 1630; says it is Mon-Sat. China Tibet Broadcast Company, address mentions Lhasa 850000, heard on 5240 around 1630-1650 Mon-Sat with English program "Holy Tibet" for 10 minutes, then Tibetan music. Also on 4905, 4920, 6110, 6150 (Harjot Singh Brar, Punjab, GRDXC) Tried for 1630 English on 9490, but faded out during previous half hour (Walt Salmani, Victoria, BC, *DXLD*) Our chances should improve in fall (gh)

TIMOR EAST This newest independent country is expected to set up a national broadcaster, though funding is scarce. No plans for SW have been mentioned, but for the record: (gh) here are the frequencies used by Portuguese, clandestine, and Indonesian stations at various times in chronological order from 1962 to 1995 according to WRTH and the DSWCI TBS/DBS-files: 3268, 3668, 3550, 3850v, 3804, 3120, 2456, 3305 (Anker Petersen, DSWCI DX Window)

TURKEY Updated Voice of Turkey schedule in English:

0300-0355	7270	11655 till Sep.1
0300-0355	7270	9650 from Sep.2
1230-1325	17615	17830
1830-1925	11960	(ex 9785)
2030-2125	9525	
2200-2255	11960	12000

(Observer, Bulgaria)

U K In his latest attempt to "cut the crap and make it happen," the BBC director general, Greg Dyke, has ordered hundreds of staff to wear silly hats as part of a £250,000 team-building exercise. The shindig was at London's Excel conference centre. BBC took over the entire building and security guards were on hand to ensure privacy. The awayday is the latest in a series of schemes Mr Dyke has instigated since taking the helm. Earlier the corporation launched a "polite police" initiative to force journalists to be courteous in the newsroom (Claire Cozens, The Guardian via Daniel Say, swprograms) Funny hats? Politeness police? What will be next, the Ministry of Silly Walks becoming a reality? As a member of a certain comedy group once said on BBC Television, "This is getting entirely too silly." (Marie Lamb, NY, swprograms, std. disclaimer)

BBC has introduced "polite police" in a bid to stop bad-tempered staff from shouting at one another. They have been drafted to make the Corporation's TV newsrooms "a nicer place to work" and encourage staff to be less rude. Staff will be encouraged to go on "familiarisation visits" to meet colleagues face-to-face so that they are less likely to bawl at each other down the phone. Staff will be encouraged to report any rudeness to the "polite police" and all allegations will be checked out (Anita Singh, Showbusiness Correspondent, PA News via Mike Cooper)

USA WORLD OF RADIO has been rescheduled on WBCQ: Wed 2200 on 7415 AND 17495; UT Thu 0415 on 7415.

The EVM Jewish Radio Network, headed by Rabbi Yaakov Spivak, started on WBCQ in June (Elayne Weiner, WBCQ) Schedule was Sun 1300-2000 17495, 2000-2300 9335 but then tested 7415 and decided to use it instead of 17495. For individual shows see <http://wbcq.net> (gh) JRN is a very important addition to the shortwaves. Finally some Jewish perspectives on the air. Hope it will

expand to other days on WBCQ.

We are reviving the offshore radio project at The Planet. The marine service of WBCQ will seek donations from listeners to outfit the Motorsailer *Katie*, offering premiums such as signed tubes once used in our transmitters. Select programs will be broadcast from the ship via our SW transmitters in Maine. The radioship will travel the coastal ports of the US east coast promoting good will thru radio communications. Pictures at <http://www.complexvariablesstudio.com> (Allan Weiner, WBCQ) WBCQ heard on 34990, 2 x 17495 at 1530 *The Intelligence Report*, ultra-rightwing militia program (Jack Sullivan, NJ, *harmonics yahoo*group) Sporadic-E, presumably (gh)

KTBN made its first frequency change in many years: 7505 ex-7510, first noted 0200 UT May 29, to avoid heavy RTTY QRM on about 7508 (George S. Thurman, TX, *DX Listening Digest*)

WJIE, Upton KY, 7490, was barely audible compared to powerhouse KTBN next door at 7505. At 0511 a program heard about WJIE; says reports from US range from weak to moderate, and signal is actually better in northern Europe. I had searched in vain the SW website <http://www.wjiesw.org> as well as the FM site <http://www.wjie.org> for some clue as to the slogan to go with the call letters, but now I heard it: "Where Jesus Is Exalted", not, I assume, referring to the method of carrier detection one would be well-advised to use in order to hear WJIE (Glenn Hauser, OK, *DX Listening Digest*) Not audible here, though I used to get WJCR easily (Tim Gaynor, Queensland) WJIE has an ad in *Radio Guide*, seeking a new or used 50 kW SW transmitter (Larry Baysinger, KY, *Cumbre DX*) Evidently off the air by mid-June, inaudible when previously detectable on 7490 around 0500 (gh, OK)

In an abrupt turnaround from his previous feisty rhetoric, former Kentucky Militia leader Charlie Puckett pleaded guilty May 24 to three of the ten federal charges against him and agreed to a sentence that could stretch to just over three years. The remaining charges, having to do with possession of pipe bombs, mines and ammunition, will be dropped at his sentencing Aug. 29, said Puckett's attorney, Gatewood Galbraith, though he will have to forfeit his arsenal. Under the plea agreement, Puckett will serve between 30 and 37 months in prison and could also be fined up to \$250,000. The ATF was led to Puckett while searching for Stephen Anderson, a former Kentucky Militia member and owner of Kentucky State Militia Radio who was accused of shooting up a Bell County deputy sheriff's cruiser in October, then disappeared. Anderson has not been found, despite a \$20,000 reward offered by the ATF (Louise Taylor, Lexington KY *Herald-Leader*) (See April MT feature on Anderson.)

New version of the WRNO website by the new owner is at <http://www.goodnewsworld.org/> - I don't think WRNO has been heard at all since last year (Donald Wilson, *DX Listening Digest*) Ha! Website still uses old 'rocky' WRNO logo, and official schedule info showing fulltime 50 kW has a severe disconnect from reality. Map with 'documented listener' locations actually shows a lot of gaps. Does this date from the Costello era, or just the ham backup transceiver? (gh)

FCC International Bureau May 28 released Public Notice IHF-00034 showing grant of CP for new International HF station KIMF effective May 6, 2002. http://svartifoss2.fcc.gov/servlet/ib.page.FetchPN?report_key=260793 Permittee is International Fellowship of Churches, Inc. Application filed on December 10, 2001, only five months earlier. Site is 1 sesquimile SW of Piñón, NM (Otero County) 32-36-33 N, 105-24-51 W (Donald Wilson, *DX Listening Digest*)

[non] United Methodist Church/Radio Africa International, via DTK Jülich, Germany, 100 kW daily: French 0400-0600 11645 145 degrees to Eaf, 13810 160 NAF; English 1700-1900 13820 145 Eaf, 15265 160 NAF (Observer, Bulgaria)

VOA women who won sex discrimination case now want tax relief on the money received: <http://www.womensenews.org/article.cfm/dyn/aid/937> (via Kim Elliott)

Former President Jimmy Carter delivered an important speech May 14 at the University of Havana that was broadcast live on Cuban state television and radio, yet Radio Martí inexplicably did not broadcast Carter's historic speech that called for permitting a referendum to bring broad reform of political rights and castigated the socialist system for the denial of basic freedoms. However, administrators, to save face, ordered the speech broadcast the following day (R. Martí Observer via Tom Roche) A few days later, May 20, Pres. Bush addressed the Cuban public on R. Martí (Nick Grace, CRW Washington Bureau) R. and TV Martí have new webpage: <http://www.martinoticias.com/> (Oscar, Miami, *DX Listening Digest*)

As headlined last month, Brother R. G. Stair, the Overcomer, the Last Day Prophet of God, remained in a Colleton County, South Carolina, jail for at least another month, since bail was denied him as a flight risk. He was believed to have access to large amounts of money in the U.S. and abroad.

Though his broadcasts disappeared from other stations, they continued full force 24 hours on one WCCR transmitter, with a few additional hours on another. Someone from the compound kept playing old tapes, so listeners would have no idea Stair was not there - except for a few brief inserts by followers saying how much they missed him, monitored by Robert Arthur early in the morning of June 6.

VENEZUELA On 4830, Radio Táchira reactivated, very strong at 1320-1407*, and back on the air when checked at 2145 (José M. Valdés R., YV5LIX, Caracas, *Conexión Digital*) Another evening heard for three hours straight (Valdés, *DXLD*)

VIETNAM [non] Voice of Kampuchea Krom, via Vladivostok, 250 kW, 230 degrees at 1400-1500 changed from Fri to Tue and from 15690 to 15660 to avoid VOA in Pashto (Observer, Bulgaria) Uses channels other than listed to escape Vietnamese jamming. One day heard them on 15705, decent signal, no jamming. Possible direct QSL address: Khmer Kampuchea Krom Federation, P. O. Box 28674, Columbus, OH 43228; Thach N. Thach, KKF Vice President. Phone 614-272-8452 (Hans Johnson, *Cumbre DX*)

WESTERN SAHARA [non] Radio Nacional Saharaui has new edress: rasdradio@yahoo.es (via Rudolf Sonntag, Germany, A-DX via BC-DX)

Until the Next, Best of DX and 73 de Glenn!

0002 UTC on 6214.98

ARGENTINA: Radio Marantha. Spanish religious program to ID, "Marantha AM desde Puerto Iguazu...Argentina...transmitiendo 24 horas del dis...para las tres fronteras y America," repeated in Portuguese. (Nicholas Eramo, Buenos Aires, Argentina/HCDX)

0006 UTC on 13565.4

PERU: Radio Ondas del Pacifico. Spanish. Romantic Peruvian music to regional time check and promo, audible 0745-0750. Peruvians audible on subsequent checks; **Radio La Hora** 4855.8, 0002-0005; **Radio San Antonio** 4940, 0004-0045; **Radio Bethel** 5940.1, 0055-0105; 0447 (Paul Ormandy, New Zealand/HCDX); **Radio Peru** 5637.3, 0110-1004; **Radio Melodia** 5996.6, 0725-0730; **Radio Tarma** 4775, 0120-0125; **Radio Sicuani** 4826.3, 1045-1050; **Radio Santa Rosa** 6045.7, 1017-1031; **Radio Victoria** 9720.4, 1122-1130; **Radio Tawantinsuyo** 6173.6, 1100-1108. (Arnaldo L. Slaen, Buenos Aires, Argentina)

0020 UTC on 9490

CLANDESTINE-GERMANY: Dem. Voice of Burma. Burmese. ID and chat to Asian music, 0030*. Radio Sweden interference. (William McGuire, Cheverly, MD)

0030 UTC on 9610

IRAN: VOIRI. Interval signal, national anthem, ID, frequency schedule into Koran readings // 11970. (McGuire, MD)

0043 UTC on 9925

GERMANY: Voice of Croatia. Station ID into local language 0045. Additional relays observed; **Saipan-Northern Marianas, Radio Free Asia relay** 13800, 2325; **Rwanda-Deutsche Welle relay** 13780, 2326; **Germany-VOA relay** 15205, 2348; **Sri Lanka-VOA relay** 15305, 2355; **Ascension Is.-BBC relay** 9825, 0050; **Philippines-VOA relay** 17735, 2211. (Stewart MacKenzie, Huntington Beach, CA)

0058 UTC on 11800

ITALY: RAI. Report on immigration boat sinking off the coast of Sicily. (Bob Fraser, Cohasset, MA; Zacharias Liangas, Greece/HCDX)

0100 UTC on 6950 USB

USA: PIRATE. Radio Nonsense. Joe Momma's blues tunes to Monty Python bits. Subsequent pirates logged as; **WHYP** 6950AM, 0102-0116+ SIO=3+44; **WMFQ** 6925 AM 0146-0159*; **Capt. Morgan** 6949.85, 0149-0208+; **Radio Metallica** 6925 AM, 0200-0214; **Radio Neptune** 6954.68, 0351-0417*; **WBNY Bunny Radio** 6950.45 AM, 2322-2338*; **Voice of the New World Order** 6950 USB, 2348-0016*. (Harold Frodge, Midland, MI) **NOEL** 6955 USB, 0222+ with excellent modulation of Christmas carols, and jingles. ID as "NOEL...all Christmas...all the time" to 0235*. (Walter Salmaniwi, Victoria, BC Canada/Cumbre DX)

0215 UTC on 11950

COLOMBIA: Radio Autentica. Harmonic signal (2x 5975.26). Spanish religious program to 0255 with ads. ID, "Cadena Radial Autentica" prior to 0300. (Al Quaglieri, NY, Ralph Brandi, NY) **La Voz del Guaviare** 6034.9, 2345-0000. (Michael Schnitzer, Germany/HCDX)

0335 UTC on 13675

UAE: Radio Dubai. Segment on Arab-Muslim institutions and mosque in Tunis in 12th century. (Howard Moser, Lincolnshire, IL)

0336 UTC on 6940

ETHIOPIA: Radio Fana. (Tentative) Announcer's indigenous language to Ethiopian style music. SIO=352+ better than // 6210. (Frodge, MI)

0345 UTC on 9490

SWEDEN: Radio. Report on pyramids in Peru. (Moser, IL) 18960, 1340. (Fraser, MA)

0405 UTC on 15515

AUSTRALIA: Radio. Report on Aussie detained at Gitmo camp. (Moser, IL) **Asia-Pacific** 9580, 1115. (Fraser, MA)

0500 UTC on 15110

KUWAIT: Radio. Newscast to feature on Islam. Pop music program amid good signal quality. Audible 1800 on 11990. (Errol Urbelis, Kings Park, NY) 11990 at 1935. (Fraser, MA)

0800 UTC on 11765

USA: KNLS Alaska. Station sign-on with interval signal and ID. Bible program and talk on tourism. (Urbelis, NY) **USA-KAIJ** 13815, 1905; **WWCR** 13845, 1840-1855; **VOA** 9680, 0030 Hindu service. (McGuire, MD) **WBCQ** 9335, 2300-2305 (Frodge, MI)

1125 UTC on 4799.9

GUATEMALA: Radio Buenas Nuevas. Spanish. Religious segment and children's choir to station ID. (Delia Lopez-Barton, El Paso, TX)

1125 UTC on 4820

HONDURAS: La Voz Evangelica. Spanish religious service to ID. (Barton, TX) **Radio Luz y Vida** 3250, 0300-0400. (Urbelis, NY)

1240 UTC on 17670

FINLAND: Radio Finland. Nordic Report-focus on rural residents' move to the city. (Fraser, MA)

1330 UTC on 9705

MEXICO: Radio Mexico Intl. Spanish. Music program of Tex-Mex Border songs. (Barton, TX) 2211-2238 "XERMEX" ID to music. (Frodge, MI) **Radio Educacion** 6185, 0805-0843. (Eramo, ARG/HCDX)

1600 UTC on 15615

ISRAEL: Kol Israel. National and world news to interviews. (Lou Rossetti, MA) 11605 // 15640, 1900. (Fraser, MA)

1732 UTC on 13860

USA: Radio Marti. Spanish commentary on Venezuela with minor signal jamming observed // 13820. (Frodge, MI) 13820, 2320; 21675, 2157 with interference via 21670 Radio Japan to 2200*. (McKenzie, CA)

1836 UTC on 15150.03

INDONESIA: Voice of. German service interspersed with local music. 1842 ID (S7-8) signal steady, but noisy. (Quaglieri, NY) **RRI-Gorontalo** 3264.657, 1253+ strongest 90 meter station with Indo music and chat for S5 signal. **RRI-Jambi** 4925.01, 1326+. Nice signal and local ID at 1324 into radio play. Slightly over modulated S7 signal. (Salmaniwi, CAN/CDX)

2037 UTC on 11675

RUSSIA: Voice of. Classical music program, SIO=443+ // 12070; 12070, 1945-2000+. (Frodge, MI) 15735, 2015; 11675, 1815. (Fraser, MA; Moser, IL) 12015, 1504+ Farsi service and Russian lesson; 7390, 1509+ World Service English with sports and cultural news. Headlines 15100 // 11500 good // 11985 poor to fair to the Middle East. (Salmaniwi, CAN/CDX)

2043 UTC on 21850

VATICAN STATE: Vatican Radio. Spanish religious service continued past 2100 minus ID. (Frodge, MI) 5890, 0343+ with atmospheric noise. (Salmaniwi, CAN/CDX)

2050 UTC on 4800

CHINA: CNR1-Shijiazhuang. Poor-fair signal alternating Chinese talk between music bridges. Time pips, ID 2100, followed by newscast. China's **Xizang PBS** audible 4820 at a lower audio level. (Paul Ormandy, New Zealand/HCDX) **China Radio Intl** 7335, 2242-2254, 13790, 1911-1915. (Frodge, MI) CRI 9580, 0100. McGuire, MD)

2110 UTC on 5100

LIBERIA: Radio Liberia Intl. English service news. (Jari Savolainen, Kuusankoski, Finland/HCDX) **ELWA** 4760, 2042 with excellent signal at S6. (Liangas, GRC/HCDX)

2158 UTC on 9990

EGYPT: Radio Cairo. Woman's Corner program, SIO=4+43. (Frodge, MI) 9475, 0059. (McKenzie, CA)

2200 UTC on 11335

NORTH KOREA: Voice of. Spanish. Interval signal to "la voz de corea" ID and anthem at 2201. Commentaries amid SIO=2+53. (Frodge, MI) 9325, 1627 with martial music. (MacKenzie, CA)

2230 UTC on 15565

NETHERLANDS ANTILLES: Radio Vlaanderen Intl. Time pips to identification. *Flanders Today's* focus on France's politics. (McGuire, MD) **Radio France Intl's** French lesson program 17620, 1430. (Fraser, MA) RFI 11955, 2100. (McGuire, MD)

2255 UTC on 7255

NIGERIA: Voice of. Poetry feature to English ID at 2359. National anthem to 2301*. SIO=444. (Frodge, MI)

2315 UTC on 9830

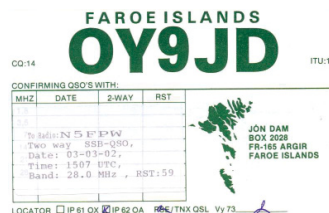
TURKEY: Voice of. *In the Wake of a Contest* features an essay series. // 9655; 12000// 11960, 2230. (Fraser, MA)

*Thanks to our contributors – Have you sent in YOUR logs?
Send to Gayle Van Horn, c/o Monitoring Times (or e-mail
gayle@webworkz.com) Please note: paper strips and cassette
recordings will no longer be accepted.
English broadcast unless otherwise noted.*

Cleaning out the QSL "In" basket!

Every so often, it occurs to me that my QSL "In" Basket must surely have a mind of its own! Scraps of paper, cards, email and letters overflow to the point I realize it's time to do something!

This month, I've decided to forego the usual QSLing tips, and focus on a jam-packed column for you readers! Next month we'll gear up for the winter DX season and bring you the latest to get you started. For now, it's time to clean up! What's *YOUR* In Basket look like? Enjoy!



AMATEUR RADIO

Azerbaijan-4K6GF, 10 meters SSB. Full data card plus post card via TA2ZV. Received in 30 days for a two US dollars and a nested Euro self-addressed envelope (used for reply). QSL Manager: Oktay Kerimov, P/B 116 C/P 81031, Kkiziltoprak, Istanbul, Turkey. (Larry Van Horn-N5FPW, NC)

Faroe Islands-OY9JD, 10 meters SSB. Full data QSL card direct. Received in 71 days for two US dollars and a nested Euro self-addressed envelope (used for reply). QSL address: Jon I Dam, Marknagilsvegur 26, Torshavn, F-100, Faroe Island. Country # 144. (Van Horn, NC)

Libya-5A1A, 10 meters SSB. Full data color photo QSL card direct on second follow up report. Received in 53 days for two US dollars and a nested Euro self-addressed envelope (used for reply). QSL Manager: A. Assid, Max Strasse 58, Bonn 53111, Germany. Abubaker was the only licensed ham in Libya active on a regular basis when I worked him in 2001. (Van Horn, NC)

Svalbard-JW9DL, 10 meters SSB. Full data color picture QSL card via LA9DL. Received in 106 days for two US dollars and a nested Euro self-addressed envelope (used for reply). QSL Manager: Ovigstad Just Nils, Nygards Alle 8 A, 0871 Oslo, Norway. (Van Horn, NC)

ANTIGUA

Deutsche Welle relay, 17765 kHz. No data verification card verified. Received in 60 days for an English report. Station address: Raderbergguertel 50, D-50968 Cologne, Germany. (David W. Weronka, Benson, NC)

BOLIVIA

Centenario "La Nueva", 4855 kHz. Full data verification letter signed by Napoleon Ardaya B.-Director, plus QSL card. Received for a Spanish report. Station address: Casilla 818 Santa Cruz de la Sierra, Bolivia. (Giampiero Bernardini, Milano, Italy/HCDX)

BRAZIL

Radio Senado, 5990 kHz. Full data verification letter signed by Lourdes Maria V.G. Carneiro-Chefe da Administracao, plus staff photos. Received for a Portuguese report. Station address: Praca dos Tres Poderes, Anexo II Bloco B-Terreo, Brasilia-DF 70165-900. (Daniele Canonica, Muggio, Switzerland)

CROATIA

Voice of, 9925 kHz. Full data QSL card, plus letter of appreciation signed by Dane Pavlic. Received in 54 days for an English report. Station address: Hrvatska Radio-Televizija, Prisavlje 3, HR-10000 Zagreb, Croatia. (Joe Squashic, Wake Forest, NC)

ECUADOR

Radio Oriental, 4780 kHz. Full data QSL card and personal letter from the station General Manager. Received in 56 days for a registered Spanish letter and a souvenir postcard. Station address: Casilla 260, Tena, Napo, Ecuador. (Frank Hillton, Charleston, SC)

HCJB, 15115 kHz. Full data 40th Anniversary card unsigned. Received in 75 days for an English report and one US dollar. Station address: Casilla 17-17-691 Quito, Ecuador. (Sam Wright, MS)

MEDIUMWAVE

CHAT-Medicine Hat, AB, 1270 kHz AM. Friendly letter signed by Dwaine Dietrich-Gen. Manager. Received in 12 days for an AM report and one US dollar. Veri signer returned my currency stating the report was "thanks enough." Station address: 1111 Kingsway Ave., SE, Box 1270, Medicine Hat, AB Canada T1A 7H5. (Patrick Griffith, Westminster, CO)

CKOM, Saskatoon, SK, 650 kHz AM. Verie written on back of Saskatchewan scenic postcard mailed in a Rawlco Radio Ltd. envelope, signed by David M. Senft-Vice Pres.-Engineering. Received in 140 days for an AM report. Note included apology for delay since station was moving. Station address: 2401 Sask Drive, Suite # 210, Regina, SK Canada S4P 4H8. (Griffith, CO)

KBJD, 1650 kHz AM. Full data station logo card and sticker. Received in 161 days for an AM report to fellow AM DXer Patrick Griffith-QSL Coordinator. Station address: 3131 S. Vaughan Way, Ste. 601, Aurora, CO 80014-3510. (Martin, OR)

KPHN, 1190 kHz AM. Verification card signed by Andrew "Drew" Kloeppel-Controller/CFO, plus bumper sticker and business card. Received in seven days for an AM report. Station address: 1212 Baltimore, Kansas City, MO 64105. (Martin, OR)

NIGERIA

Voice of, 15120 kHz. Full data, stamped QSL card, plus program schedule and VON sticker. Received in 192 days for an English report and two US dollars. Station address: Broadcasting House, Private Mail. Bag. 40003, Falomo, Ikoyi-Lagos, Nigeria. (Squashic, NC)

ROMANIA

Radio Romania Intl, 11775 kHz. Full data station card unsigned. Received in 30 days for an English report. Station address: P.O. Box 111, RO-70756 Bucharest, Romania. (Weronka, NC)

RUSSIA

Radio Vlaanderen Intl relay, 9925 kHz. Partial data scenery card unsigned, without transmitter notation, plus stickers. Received in 15 days for an English report and one US dollar. Station address: 1043 Brussels, Belgium. (Duane Hadley, Bristol, TN)

ST. HELENA

Radio St. Helena, 11092.5 USB kHz. Full data station logo card, verified for last broadcast Oct. 23, 1999. QSL card is # 117 of 727 verified. Received for an English report. Station address: St. Helena Post Office, Jamestown, South Atlantic Ocean. (John M. Hanna, Franklin Park, IL) *Anyone else still waiting on this one? -gvh.*

UTILITY

China-XSG, Shanghai Coast Radio, 12649.5 kHz USB. Full data verification card, plus local scenic postcard. Received in 92 days for a utility report and one US dollar. Station address: 7th Floor 20 Guang Dong Road, Shanghai, China. (George Clement, Powder Springs, GA)

VIETNAM

Voice of, 6175 kHz. Full data QSL, plus station pennant and program schedule. Received in 78 days for an English report. Station address: c/o English Service, 58 Quan Su, Hanoi, Vietnam. (Squashic, NC; Tom Banks, Dallas, TX)

ZAMBIA

Christian Voice, 4965 kHz. Full data station card verified with initials. Received in 64 days for an English report and two US dollars. Station address: Private Bag E 606, Lusaka, Zambia. (Brian Bagwell, St. Louis, MO)

The 1952 Olympics, YLE and DRM

Last Saturday night at 8:00 local time (I live in upstate New York) found me – of all places – listening to an hour-long program about the 1952 Summer Olympics in Helsinki, Finland. The venue was *YLE Radio Finland*'s relatively new feature, **Capital Weekend**, which uses an hour to examine in depth some aspect of, or issue of import to, that Scandinavian country. Ironically, earlier in the week, *YLE* announced a decision to end all but its Finnish language programs, presenting as justification the "fact" that *YLE*'s charter does not explicitly authorize the station to broadcast programming for an international audience other than for Finns traveling and living abroad. (They just discovered that?)

Anyway, the 1952 Helsinki Olympics: pretty esoteric, no? I mean, who cares about the 50th anniversary of this obscure event – other than the Finns, that is. With all that's going on in the world today, what significance could this occurrence possibly have? Maybe *YLE* ought to end its English language programming, if this is the best it can come up with. Right?

Wrong. It turns out that the 1952 Helsinki Olympics were the first ones attended by the Soviet Union since 1912. It turns out that holding the Olympics in Finland, just after World War II and just after Finland and the Soviets had fought a border war, did much to solidify the demarcations – social, political, attitudinal, economic, sport – of the Cold War. (I know we Americans have a notoriously short memory when it comes to history; but you remember the Cold War – don't you?) It turns out that these Olympics also did much to improve Finland's sense of security as the country on the doorstep of the Iron Curtain.

◆ It's All "Good"

All of the interviews and discussions conducted as part of this installment of **Capital Weekend** turned out to be most interesting. There was a conversation about the innovative methods developed by media of the time to cover the Games. There were reminiscences about medal winners, recalled accounts of noteworthy competitions and explications of the differing views of sport held by East and West that first became evident in 1952. What may have seemed at first glance to be of little or no interest turned out to be of great interest.

That is the essential magic of international broadcasting. To the open and truly curious mind, there is something of value to be found in all programs. Every broadcast – even the legend-

ary tractor production reports from the old east bloc stations and the odes to the "dear leader" on the Voice of Korea – offers a glimpse at life in the originating station's country. It may lack production skills, serve as the antithesis of entertainment and challenge the patience of even the most accepting listener; but it still will have some value to the keen observer.

◆ Not Just the World is Shrinking

Of course, this is an idealistic view. Not all – maybe not even many – radio listeners see things this way. Oddly enough, globalization has made many of us less interested in the world around us. Globalization in some ways seems to be synonymous with homogenization. Diversity somehow seems to be less valued. As the world shrinks, so apparently does the interest of many of our fellows in it. On the whole, it appears we're becoming less tolerant and more demanding. Asking the listener to bring something to the table – whether it be a reasonable level of curiosity, an acceptance of something less than perfect sound or a basic skill level (I mean, learning to tune a radio is so hard!) – seems almost out of the question.

Longtime shortwave listeners screw up their faces incredulously when it is pointed out to them that the aural quality of such broadcasts leaves something to be desired. Of course, they say, but (with apologies to Cedric the Entertainer) "it ain't that bad!" Unfortunately, the "new experts" don't agree.

◆ DRM is Coming

So, some broadcasters like *NRK* Norway, *SRI* Switzerland and, now, *YLE* Finland seem to be concluding that there's no point in broadcasting to an international audience. Still others, such as *ROI* Austria, appear to be on a year-to-year lease. However, just as some appear to be (pre-

maturely) raising the white flag, others are looking to something called **Digital Radio Mondiale – DRM** for short – to revitalize the medium. And do you know what? It appears to stand much better than half a chance to do just that.

DRM's backers – including broadcasters like *Radio Netherlands*, the *BBC*, *Deutsche Welle*, *RCI*, *Radio Sweden*, Merlin and equipment makers like Sony, Sangean, Bosch, Telefunken and Thales – are set to start rolling it out early in 2003. Today, **DRM** has expanded into an international consortium of more than 70 broadcasters, manufacturers, network operators, research institutions, broadcasting unions and regulatory bodies. So, maybe it's about time *you* got to know **DRM**.

◆ What is DRM?

In a nutshell, **DRM** is a universal, non-proprietary digital broadcast system for the AM broadcasting bands below 30 MHz – shortwave, medium wave and longwave. The key feature of **DRM** is the quality of the audio. The improvement over conventional analogue audio is immediately noticeable, comparable to monaural FM quality. Over and above the audio, the **DRM** system has the capacity to integrate data and text which can be displayed on **DRM** capable receivers to enhance the listening experience.

DRM has other significant advantages. It uses existing AM broadcast frequency bands and is designed to fit in with the existing AM broadcast band plan. **DRM** also allows for simultaneous transmission of traditional analogue and digital signals on the same frequency allocation. In addition, many existing AM transmitters can be easily modified to carry **DRM** signals and the robustness of the **DRM** signal can be matched to different propagation conditions.

Testing is under way and observers report even better than expected success thus far.

DRM signals will be receivable through fixed and portable radios, car receivers, software receivers and PDAs, all of which are under development. It is likely that some receivers will be able to receive both analog and digital signals. A software receiver is expected to be ready for production within weeks of the time you read this.

For much more information – including technical data, test results, progress reports and the latest developments – refer to <http://www.drm.org> on the Internet.

See you in September!





HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af
 ① ② ⑤ ③ ④ ⑥ ⑦

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Daylight Savings Time) 4, 5, 6, or 7 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each page.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC *Sunday* will be heard on *Saturday* evening in America (in other words, 8:30 pm Eastern, 7:30 pm Central, etc.).

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. On the top half of the page English broadcasts are listed by UTC time on ①, then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not daily, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

Day Codes

s/S	Sunday
m/M	Monday
t/T	Tuesday
w/W	Wednesday
h/H	Thursday
f/F	Friday
a/A	Saturday
D	Daily
mon/MON	monthly

In the same column ⑤, irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "v" (various languages).

Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions. But they can also change in response to short-

term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and MT readers to make the Shortwave Guide up-to-date as of one week before print deadline.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas

af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
au:	Australia
ca:	Central America
do:	domestic broadcast
eu:	Europe
irr:	irregular (Costa Rica RFPI)
me:	Middle East
na:	North America
om:	omnidirectional
pa:	Pacific
sa:	South America
va:	various

Choose a program or station you want to hear.

Selected programs for prime listening hours appear following the frequencies – space does not permit 24 hour listings nor can every station be listed. However, listings for the most popular stations and selected lesser-known stations illustrate the variety available on shortwave. The format of the listings alternates among three different styles – by station, by genre and by day – month by month. Times listed are approximate and programs are subject to change.

The program listings emphasize broadcasts targeted to North America. In most cases, the stations and programs listed should be readily receivable in North America using a portable radio. Most broadcasters produce one broadcast in English per day that is repeated over a 24 hour period to all areas. If you are able to listen to transmissions to other areas of the world during "non-prime time" hours, referring to the prime time listings for those stations will likely be helpful in determining what programs will be broadcast.

Occasionally, a program or station listing may be followed by a reference to another listing for the same program or station at a different time. This is done to conserve space and make it possible to provide more listings.

MT MONITORING TEAM

Gayle Van Horn Frequency Manager gayle@webworkz.com	John Figlio Program Manager jfiglio1@nycap.rr.com
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Mark Fine, VA
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Program Highlights

John Figlio

BBCWS – A Year After

Since July 2001, when the **BBC World Service** shut off direct shortwave broadcasts to North America, we've learned that nearly all of us can still hear the station on shortwave – and often quite well at that. There may be a little less coverage, especially during the morning; but this has proven manageable for most listeners. So one year later, this stands out above all else: It's not so much *what* the **BBC** did, but *how* they went about doing it that, in the end, has left the most lasting impression.

A first year student in public relations could have handled this more productively than the **BBC** did last summer. The mildly disparaging, confrontational attitude used initially toward longtime shortwave listeners here was unnecessary, ill advised, counterproductive and most unworthy of a broadcaster of this stature.

The correct approach should have been something along these lines: "We're ending direct shortwave broadcasts to your area of the world. However, in addition to FM, the internet and other means we are adding, you still should be able to hear us on shortwave via our broadcasts to other regions. If you have trouble hearing us, contact us and we'll try to help you." Over time, *WS* marketing and publicity has pretty much come around to this approach – but that first impression lingers.

Of course, other things are glaringly apparent as well. FM has not turned out to be a suitable substitute and neither has the Internet, *XM* or *Sirius*. It's great to have the **BBC** available via these delivery mechanisms. But – even using all of these combined without shortwave – it still leaves most listeners with sharply limited access. A **BBC** acknowledgement of these facts would be nice, but won't be forthcoming. However, if *DRM* (see Programming Spotlight) does emerge as planned in 2003, the **BBCWS** would be best advised to embrace it enthusiastically.

USA Part 2 Deferred

July's *Programming Spotlight* column promised a review of US private shortwave broadcasting for August. This topic will appear in September's column instead.



0000 UTC - 8PM E / 7PM C / 5PM P

0000	0015	Cambodia, National Radio Of	11940as			
0000	0015	Japan, Radio	13650as	17810as		
0000	0015	Japan, Radio	6145na	13650as	17810as	
0000	0030	Egypt, Radio Cairo	9900na			
0000	0030	Mexico, Radio Mexico Intl		9705am	11770am	
0000	0030	mtwhf/vl	Solomon Islands, SIBC	5020do		
0000	0030		Sri Lanka, SLBC	4940do		
0000	0030		Thailand, Radio	9690va		
0000	0030	vl	Vanuatu, Radio	4960do	7260do	
0000	0045		India, All India Radio	9705as	9950as	11620as 13605as
0000	0055		Spain, R Exterior Espana	15385na		
0000	0100		Anguilla, Caribbean Beacon	6090am		
0000	0100		Australia, ABC NT Alice Springs	4835do		
0000	0100		Australia, ABC NT Katherine	5025do		
0000	0100		Australia, ABC NT Tennant Crk	4910do		
0000	0100		Australia, Radio	9660pa	12080pa	15240pa 15415as
0000	0100		17580pa 17750as	17775pa	21725as	
0000	0100	irr/vl	Cameroon, RTV	4850do		
0000	0100		Canada, CBC Northern Service	9625do		
0000	0100		Canada, CFRX Toronto ON	6070do		
0000	0100		Canada, CFVP Calgary AB	6030do		
0000	0100		Canada, CKZN St John's NF	6160do		
0000	0100		Canada, CKZU Vancouver BC	6160do		
0000	0100		Canada, Radio Canada Intl	9640as	11895as	
0000	0100		Costa Rica, R for Peace Intl	15050va	21815usb	
0000	0100		Costa Rica, University Network	5030am	6150am 7375am	9725sa
			11870am 13750na			
0000	0100	a/monthly	Finland, Scandv Weekend Radio	5980va	11720va	
0000	0100	m	Finland, YLE/Radio Finland	11990na	13730na	
0000	0100	my/vl	Guatemala, Radio Cultural	3300do	5955do	
0000	0100		Guyana, Voice of	3290do		
0000	0100		Malaysia, Radio	7295do		
0000	0100		Namibia, NBC	3270af	3290af	
0000	0100		Netherlands, Radio	6165na	9845na	
0000	0100		New Zealand, Radio NZ Intl	17675pa		
0000	0100		Russia, University Network	9940as		
0000	0100		Singapore, SBC Radio One	6150do		
0000	0100		UK, BBC World Service	3915as	5875as 5970as 5975am 6195va	
			9410as 9825sa 11835ca	11765me	11945as 11955as 12095sa	
			15280as 15310as 15360as	17615as		
0000	0100		Ukraine, R Ukraine Intl	5905as	7320as 12040as	
0000	0100		USA, Armed Forces Network	4319usb	4993usb 5765usb 6350usb	
			6458usb 10320usb	10940usb	12689usb 13362usb	
0000	0100		USA, KAUJ Dallas TX	13815va		
0000	0100		USA, KTBK Salt Lk City UT		15590na	
0000	0100		USA, KWHR Naalehu HI	17510as		
0000	0100	twhfa	USA, Voice of America	5995am	6130am 7405am 9455am 9775am	
			11695am 13790am			
0000	0100		USA, WBCQ Kennebunk, ME	7415na	9335na	
0000	0100		USA, WEWN Birmingham AL	5825na	9355na 15745na	
0000	0100		USA, WHRA Greenbush ME	7580va		
0000	0100		USA, WHRI Noblesville IN	5745va	7315am	
0000	0100		USA, WINB Red Lion PA	12160am		
0000	0100		USA, WJIE Louisville KY	7490am	13595am	
0000	0100	mtwhf	USA, WRMI Miami FL	7385am		
0000	0100		USA, WRMI Miami FL	9955am		
0000	0100		USA, WRNO New Orleans LA	7355am		
0000	0100		USA, WSHB Cypress Creek SC	7535am	9430sa 15285sa	
0000	0100		USA, WTJC Newport NC	9370na		
0000	0100	sm	USA, WWBS Macon GA	11900na		
0000	0100		USA, WWCN Nashville TN		3210na 5070na 7465na	
			13845na			
0000	0100		USA, WWRB Manchester TN	3270va	5085va 6890va 9320va	
0000	0100		USA, WYFR Okeechobee FL	6085na	9505na	
0000	0100		Zambia, Christian Voice	4965af		
0000	0115	vl	Pakistan, Radio	11580as	15455as	
0003	0010		Croatia, Croatian Radio	9925sa		
0015	0100		Japan, Radio	6145na		
0030	0100		Iran, VOIRI 9610am	11970na		
0030	0100		Lithuania, R Vilnius	11690na		
0030	0100	as/vl	Solomon Islands, SIBC	5020do		
0030	0100		Sri Lanka, SLBC	6005as	6075as 6130do 9770as 15425as	
0030	0100		Thailand, Radio	15395na		
0030	0100		UAE, AWR	6035as	6055as	
0030	0100		USA, Voice of America	7215va	9770va 11760va 15185va 15290va	
			17740va 17820va			
0055	0100		Italy, RAI Intl	9675na	11800na	

0100 UTC - 9PM E / 8PM C / 6PM P

0100	0115	Italy, RAI Intl	9675na	11800na		
0100	0125	Netherlands, Radio	6165na	9845na		
0100	0127	Czech Rep, Radio Prague Intl		7345na	11615na	
0100	0127	Vietnam, Voice of	6175na			
0100	0130	s	Germany, Universal Life/Santec	9435as		
0100	0130		Hungary, Radio Budapest	9560na		
0100	0130		Iran, VOIRI 9610am	11970na		
0100	0130		Slovakia, R Slovakia Intl	5930na	6190ca 9440sa	
0100	0130	twhfa	USA, Voice of America	5995am	6130am 7405am 9455am	
			13790am			
0100	0130		Uzbekistan, Radio Tashkent	5025as	7190as 9375as 9530as	
0100	0145		Germany, Deutsche Welle	6040na	9640am 11810na	
			13720am			
0100	0156		North Korea, Voice of	6195as	7140as 9345as 11735ca	
			13760ca 15180ca			
0100	0159		Canada, Radio Canada Intl	5960am	13670am 15170am	
			15305am			
0100	0200		Anguilla, Caribbean Beacon	6090am		
0100	0200		Australia, ABC NT Katherine	5025do		
0100	0200		Australia, ABC NT Tennant Crk	4910do		
0100	0200		Australia, Radio	9660pa	12080pa 15240pa 15415as	
			17580pa 17750as 17775pa	17795pa	21725as	
0100	0200		Canada, CBC Northern Service	9625do		
0100	0200		Canada, CFRX Toronto ON	6070do		
0100	0200		Canada, CFVP Calgary AB	6030do		
0100	0200		Canada, CKZN St John's NF	6160do		
0100	0200		Canada, CKZU Vancouver BC	6160do		
0100	0200		China, China Radio Intl	9580na		
0100	0200		Costa Rica, R for Peace Intl	15050va	21815usb	
0100	0200		Costa Rica, University Network	5030am	6150am 7375am 9725sa	
			11870am 13750na			
0100	0200		Cuba, Radio Havana	6000na	9820na 11705usb	
0100	0200		Ecuador, HCB	9745na	11960na 21455usb	
0100	0200	a/monthly	Finland, Scandv Weekend Radio	5980va	11720va	
0100	0200	m/vl	Guatemala, Radio Cultural	3300do	5955do	
0100	0200		Guyana, Voice of	3290do		
0100	0200		Indonesia, Voice of	9525pa	11785al 15150as	
0100	0200		Japan, Radio	11860as	11870me 11880me 15325as	
			17685pa 17810as	17835sa		
0100	0200		Malaysia, Radio	7295do		
0100	0200		Namibia, NBC	3270af	3290af	
0100	0200		New Zealand, Radio NZ Intl	17675pa		
0100	0200		Russia, University Network	9940as		
0100	0200		Russia, Voice of Russia	9665na	9725na 11825na 12000na	
			17595na			
0100	0200		Singapore, SBC Radio One	6150do		
0100	0200	vl	Solomon Islands, SIBC	5020do		
0100	0200		Sri Lanka, SLBC	6005as	6075as 6130do 9770as	
			15425as			
0100	0200		UK, BBC World Service	5975am	6195as 9410as 9825as	
			11955sa 15280as 15310as	15360eu 17615as 17790af		
0100	0200		USA, Armed Forces Network	4319usb	4993usb 5765usb	
			6350usb 6458usb	10320usb	10940usb 12689usb	
			13362usb			
0100	0200		USA, KAUJ Dallas TX	5755va		
0100	0200		USA, KTBK Salt Lk City UT		7505na	
0100	0200		USA, KWHR Naalehu HI	17510as		
0100	0200		USA, Voice of America	7115me	9635va 11705va 11725va	
			11820va 13650va 17740va	17820va		
0100	0200		USA, WBCQ Kennebunk, ME	7415na	9335na	
0100	0200		USA, WEWN Birmingham AL	5825na	9355na 15745na	
0100	0200		USA, WHRA Greenbush ME	7580va		
0100	0200		USA, WHRI Noblesville IN	5745va	7315am	
0100	0200		USA, WINB Red Lion PA	12160am		
0100	0200		USA, WJIE Louisville KY	7490am	13595am	
0100	0200		USA, WRMI Miami FL	9955am		
0100	0200		USA, WRNO New Orleans LA	7355am		
0100	0200		USA, WSHB Cypress Creek SC	7535am	9430sa 15285sa	
0100	0200		USA, WTJC Newport NC	9370na		
0100	0200		USA, WWCN Nashville TN		3210na 5070na 5935na 7465na	
0100	0200		USA, WWRB Manchester TN	5085va	6890va	
0100	0200		USA, WYFR Okeechobee FL	6065na	9505na 15060as	
0100	0200		Zambia, Christian Voice	4965af		
0103	0110		Croatia, Croatian Radio	9925sa		
0130	0145	vl	Libya, Voice of Africa	15435irr	17750irr	
0130	0200		Austria, Radio Austria Intl		9870na	
0130	0200		Sweden, Radio	13625va		
0130	0200		UK, RTE Radio	6155na		
0130	0200	twhfa	USA, Voice of America	5995am	6130am 7405va 9455am 9775va	
			13740va			

SELECTED PROGRAMMING BEGINS ON PAGE 55

Shortwave Guide



0140 0200 Vatican City, Vatican Radio 9650au 12055au
0145 0200 twfha Albania, Radio Tirana Intl 6115na 7160na

0200 UTC - 10PM E / 9PM C / 7PM P

0200	0227	Czech Rep, Radio Prague Intl	6200na	7345na		
0200	0230	Austria, AWR	9820as			
0200	0230	sm w fa Belarus, Radio Belarus Intl	6070eu	7210eu		
0200	0230	Myanmar, Radio	7185do			
0200	0230	as/vl Solomon Islands, SIBC	5020do			
0200	0245	Germany, Deutsche Welle	11965as	13720as	15370as	
0200	0256	North Korea, Voice of	11845as	15230as		
0200	0257	Canada, Radio Canada Intl	15260as	17860as		
0200	0300	Anguilla, Caribbean Beacon	6090am			
0200	0300	twfha Argentina, RAE	11710am			
0200	0300	Australia, ABC NT Alice Springs	4835do			
0200	0300	Australia, ABC NT Katherine	5025do			
0200	0300	Australia, ABC NT Tennant Crk	4910do			
0200	0300	Australia, Radio	9660pa	12080pa	15415as	
		15515pa 17580pa	17750as	21725as		
0200	0300	Bulgaria, Radio	9400na	11700na		
0200	0300	Canada, CBC Northern Service	9625do			
0200	0300	Canada, CFRX Toronto ON	6070do			
0200	0300	Canada, CFVP Calgary AB	6030do			
0200	0300	Canada, CKZN St John's NF	6160do			
0200	0300	Canada, CKZU Vancouver BC	6160do			
0200	0300	Costa Rica, R for Peace Intl	7455va	15050va		
0200	0300	Costa Rica, University Network	5030am	6150am	7375am	9725sa
		11870am 13750na				
0200	0300	Cuba, Radio Havana	6000na	9820na	11705usb	
0200	0300	Ecuador, HCJB	9745na	11960na	21455usb	21470as
0200	0300	Egypt, Radio Cairo	9475na			
0200	0300	a/monthly Finland, Scandv Weekend Radio	5980va	11720va		
0200	0300	m/vl Guatemala, Radio Cultural	3300do	5955do		
0200	0300	Guyana, Voice of	3290do	5950do		
0200	0300	Kenya, Kenya BC Corp	4885do	4935do		
0200	0300	Malaysia, Radio	7295do			
0200	0300	Namibia, NBC	3270af	3290af		
0200	0300	New Zealand, Radio NZ Intl	17675pa			
0200	0300	Philippines, Radio Pilipinas	12015as	15120as	15270as	
0200	0300	Romania, R Romania Intl	9510na	11940na	15105as	15180as
		17815pa				
0200	0300	Russia, University Network	9940as			
0200	0300	Russia, Voice of Russia	9665na	12000na	17595na	
0200	0300	Singapore, SBC Radio One	6150do			
0200	0300	mtwhf/vl Solomon Islands, SIBC	5020do			
0200	0300	South Korea, R Korea Intl	7275as	9560na	11725sa	11810sa
		15575na				
0200	0300	Sri Lanka, SLBC	6005as	6075as	6130do	9770as
0200	0300	Taiwan, R Taipei Intl	5950na	9680na	11740na	15320as
0200	0300	UK, BBC World Service	5975am	6195as	9410as	9510eu
		9825sa 11835ca 12095sa	15280as	15310as	15360eu	15470af
		17790af				
0200	0300	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb
		6458usb 10320usb	10940usb	12689usb	13362usb	
0200	0300	USA, KAU Dallas TX	5755va			
0200	0300	USA, KJES Vado NM	7555na			
0200	0300	USA, KTBN Salt Lk City UT	7505na			
0200	0300	USA, KWHR Naalehu HI	17510as			
0200	0300	USA, Voice of America	7115va	9635va	11705va	11725va
		13650va 17740va	17820va			
0200	0300	USA, WBCQ Kennebunk, ME	7415na	9335na		
0200	0300	USA, WEWN Birmingham AL	5825na	9355na	15745na	
0200	0300	USA, WHRA Greenbush, ME	7580va			
0200	0300	USA, WHRI Noblesville, IN	5745va	7315am		
0200	0300	USA, WJIE Louisville KY	7490am	13595am		
0200	0300	USA, WRMI Miami FL	7385am			
0200	0300	USA, WRNO New Orleans LA	7355am			
0200	0300	USA, WSHB Cypress Creek SC	5850am	7535eu	9430af	
0200	0300	USA, WTJC Newport NC	9370na			
0200	0300	USA, WWCN Nashville TN	3210na	5070na	5935na	7465na
0200	0300	USA, WWRB Manchester TN	5085va	6890va		
0200	0300	USA, WYFR Okkeechobee FL	6065na	9505na		
0200	0300	Zambia, Christian Voice	4965af			
0200	1215	Cambodia, National Radio Of	11940as			
0203	0210	Croatia, Croatian Radio	9925na			
0215	0220	Nepal, Radio	3230as	5005as		
0230	0257	Vietnam, Voice of	6175na			
0230	0300	Albania, Radio Tirana Intl	6115eu	7160eu		
0230	0300	Hungary, Radio Budapest	9570na			
0230	0300	Slovakia, AWR	7235as			
0230	0300	Sweden, Radio	9490na			
0230	0300	a UK, Wales Radio Intl	9795na			
0230	0300	vi Zambia, Radio ZNBC	4910do	6265al		
0250	0300	Vatican City, Vatican Radio	7305am	9605am		

0300 UTC - 11PM E / 10PM C / 8PM P

0300	0310	Vatican City, Vatican Radio	7305am	9605am		
0300	0327	Czech Rep, Radio Prague Intl	7345na	7385na	9870na	
0300	0330	Ecuador, HCJB	11960na	21470as		
0300	0330	Egypt, Radio Cairo	9475na			
0300	0330	Philippines, Radio Pilipinas	12015as	15120as	15270as	
0300	0330	S Africa, Channel Africa	6035af			
0300	0330	Thailand, Radio	15395na			
0300	0330	USA, KJES Vado NM	7555na			
0300	0330	USA, KVOH Los Angeles CA	9975na			
0300	0345	Germany, Deutsche Welle	9535na	9640na	11935am	
		15105na				
0300	0356	China, China Radio Intl	9560na	9690na		
0300	0356	North Korea, Voice of	6195as	7140as	9345as	
0300	0400	Anguilla, Caribbean Beacon	6090am			
0300	0400	Australia, ABC NT Alice Springs	4835do			
0300	0400	Australia, ABC NT Katherine	5025do			
0300	0400	Australia, ABC NT Tennant Crk	4910do			
0300	0400	Australia, Radio	9660pa	12080pa	15240as	15415as
		15515pa 17580pa	17750as	21725as		
0300	0400	vi Botswana, Radio	3356do	4820do	7255do	
0300	0400	Canada, CBC Northern Service	9625do			
0300	0400	Canada, CFRX Toronto ON	6070do			
0300	0400	Canada, CFVP Calgary AB	6030do			
0300	0400	Canada, CKZN St John's NF	6160do			
0300	0400	Canada, CKZU Vancouver BC	6160do			
0300	0400	Costa Rica, R for Peace Intl	7455va	15050va		
0300	0400	Costa Rica, University Network	5030am	6150am	7375am	9725sa
		11870am 13750na				
0300	0400	Cuba, Radio Havana	6000na	9820na	11705usb	
0300	0400	Ecuador, HCJB	9745na	11960na	21455usb	
0300	0400	a/monthly Finland, Scandv Weekend Radio	5980va	11720va		
0300	0400	vi Guatemala, Radio Cultural	3300do	5955do		
0300	0400	Guyana, Voice of	3290do	5950do		
0300	0400	Japan, Radio	17825ca	21610pa		
0300	0400	Kenya, Kenya BC Corp	4885do	4935do		
0300	0400	Malaysia, Radio	7295do			
0300	0400	Namibia, NBC	3270af	3290af		
0300	0400	New Zealand, Radio NZ Intl	17675pa			
0300	0400	Oman, Radio	15355va			
0300	0400	Russia, University Network	17765as			
0300	0400	Russia, Voice of Russia	7180na	11750na	12000na	
		17565na 17650na	17660na	17690na		
0300	0400	Singapore, SBC Radio One	6150do			
0300	0400	mtwhf/vl Solomon Islands, SIBC	5020do			
0300	0400	Sri Lanka, SLBC	6005as	6075as	6130do	9770as
0300	0400	Taiwan, R Taipei Intl	5950na	9680na	11875as	15320as
0300	0400	Turkey, Voice of	7270af	11655va		
0300	0400	Uganda, Radio	4976do	5026al	7195al	
0300	0400	UK, BBC World Service	3255af	6005af	6190af	6195eu
		7160af 9410eu	11730as	11835am	12095sa	15280as
		15360as 15420af	15575me	17790as		
0300	0400	Ukraine, R Ukraine Intl	7150as	12040as		
0300	0400	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb
		6458usb 10320usb	10940usb	12689usb	13362usb	
0300	0400	USA, KAU Dallas TX	5755va			
0300	0400	USA, KTBN Salt Lk City UT	7505na			
0300	0400	USA, KWHR Naalehu HI	17510as			
0300	0400	USA, Voice of America	5855af	6080af	7105af	7290af
		9575af 9885af	17895af			
0300	0400	USA, WBCQ Kennebunk, ME	7415na	9335na		
0300	0400	USA, WEWN Birmingham AL	5825na	9425na	15745na	
0300	0400	USA, WHRA Greenbush, ME	7580va			
0300	0400	USA, WHRI Noblesville, IN	5745va	7315am		
0300	0400	USA, WJIE Louisville KY	7490am	13595am		
0300	0400	USA, WMLK Bethel PA	9465eu			
0300	0400	USA, WRMI Miami FL	7385am			
0300	0400	USA, WRNO New Orleans LA	7395am			
0300	0400	USA, WSHB Cypress Creek SC	5850am	7535eu	9455eu	11550va
0300	0400	USA, WTJC Newport NC	9370na			
0300	0400	USA, WWCN Nashville TN	3210na	5070na	5935na	7465na
0300	0400	USA, WWRB Manchester TN	5085va	6890va		
0300	0400	USA, WYFR Okkeechobee FL	6065na	9505na		
0300	0400	Zambia, Christian Voice	6065af			
0300	0400	Zambia, Radio ZNBC	4910do	6265al		
0310	0310	Vatican City, Vatican Radio	7305am	9605am	9660af	
0315	0340	Vatican City, Vatican Radio	9660af			
0330	0345	vi Libya, Voice of Africa	15435irr	17750irr		
0330	0350	UAE, Emirates Radio	12005na	13675na	15395na	15435na
0330	0357	Czech Rep, Radio Prague Intl	11600va	15260va		
0330	0357	Vietnam, Voice of	6175na			
0330	0400	Ecuador, HCJB	11960na			
0330	0400	Malaysia, RTM Kota Kinabalu	5979do			
0330	0400	Nigeria, Radio/Kaduna	4770do			
0330	0400	Nigeria, Radio/Lagos	3326do	4990al		

Shortwave Guide



0330 0400 Sweden, Radio 9490na
 0330 0400 UAE, AWR 17780as
 0345 0400 f Seychelles, FEBA Radio 11880af
 0345 0400 Tajikistan, Radio 7245as

0400 UTC - 12AM E / 11PM C / 9PM P

0400	0415		Israel, Kol Israel	9435na	15640va	17600va			
0400	0425		Belgium, RVI Flanders R Intl	15565na					
0400	0430	mtwhf	France Radio France Intl	9550af	15155af				
0400	0430	vi	Guatemala, Radio Cultural	3300do	5955do				
0400	0430	twfhas	Mexico, Radio Mexico Intl	9705am	11770am				
0400	0430		S Africa, AWR	7235af					
0400	0430		S Africa, Channel Africa	5955af					
0400	0430		Sri Lanka, SLBC	6005as	6075as	6130do	9770as	15475as	
0400	0445		Germany, Deutsche Welle	6180af	7225af	12045af	13690af		
0400	0458		New Zealand, Radio NZ Intl	17675pa					
0400	0500		Anguilla, Caribbean Beacon	6090am					
0400	0500		Australia, ABC NT Alice Springs	4835do					
0400	0500		Australia, ABC NT Katherine	5025do					
0400	0500		Australia, ABC NT Tennant Crk	4910do					
0400	0500		Australia, Radio	9660pa	12080pa	15240pa	15415as		
			15515pa	17580pa	17750as				
0400	0500	vi	Botswana, Radio	3355do	4820do	7255do			
0400	0500	irr/vl	Cameroon, RTV	4850do					
0400	0500		Canada, CBC Northern Service	9625do					
0400	0500		Canada, CFRX Toronto ON	6070do					
0400	0500		Canada, CKZN St John's NF	6160do					
0400	0500		Canada, CKZU Vancouver BC	6160do					
0400	0500		China, China Radio Intl	9730na					
0400	0500		Costa Rica, R for Peace Intl	7455va	15050va				
0400	0500		Costa Rica, University Network	5030am	6150am	7375am	9725sa		
			11870am	13750na	17645as				
0400	0500		Cuba, Radio Havana	6000na	9820na	11705usb			
0400	0500		Ecuador, HCJB	9745na	11960na				
0400	0500	a/monthly	Finland, Scandv Weekend Radio	5980va	11720va				
0400	0500		Germany, Voice of Hope	15715me					
0400	0500		Guyana, Voice of	3290do	5950do				
0400	0500		Kenya, Kenya BC Corp	4885do	4935do				
0400	0500		Malaysia, Radio	7295do					
0400	0500		Malaysia, RTM Kota Kinabalu	5979do					
0400	0500		Malaysia, Voice of	6175as					
0400	0500		Namibia, NBC	3270af	3290af				
0400	0500		Nigeria, Radio/Kaduna	4770do	6090do				
0400	0500		Nigeria, Radio/Lagos	3326do	4990al				
0400	0500		Nigeria, Voice of	7255af					
0400	0500		Romania, R Romania Intl	9510na	11940na	17735as	21480as		
0400	0500		Russia, University Network	17765as					
0400	0500		Russia, Voice of Russia	7180na	9665na	11750na	12000na		
			17565na	17650na	17660na				
0400	0500		Singapore, SBC Radio One	6150do					
0400	0500	mtwhf/vl	Solomon Islands, SIBC	5020do					
0400	0500		Uganda, Radio	4976do	5026al	7195al			
0400	0500		UK, BBC World Service	3255af	6005af	6190af	6195af	7120af	
			7160af	9410eu	11835am	12095va	15310as	15420af	
			15575va	21660as	21830as				
0400	0500		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb		
			6458usb	10320usb	10940usb	12579usb	12689usb	13362usb	
0400	0500		USA, KALJ Dallas TX	5755va					
0400	0500		USA, KTBN Salt Lk City UT	7505na					
0400	0500		USA, KWHR Naalehu HI	17780as					
0400	0500		USA, Voice of America	4960af	5855af	6080af	9530va	7275af	
			7290af	9575af	11965va	15205va	17895af		
0400	0500		USA, WBCQ Kennebunk ME	7415na					
0400	0500		USA, WEWN Birmingham AL	5825na	7425na	15745na			
0400	0500		USA, WHRA Greenbush ME	7580va					
0400	0500		USA, WHRI Noblesville IN	5745va	7315am				
0400	0500		USA, WJIE Louisville KY	7490am	13595am				
0400	0500		USA, WMLK Bethel PA	9465eu					
0400	0500		USA, WRMI Miami FL	7385am					
0400	0500		USA, WSHB Cypress Creek SC	5850am	7535eu	9455eu			
			11550am	15195am					
0400	0500		USA, WTJC Newport NC	9370na					
0400	0500		USA, WWCN Nashville TN	3210na	5070na	5935na	7560na		
0400	0500		USA, WWRB Manchester TN	5085va	6890va				
0400	0500		USA, WYFR Okeechobee FL	6065na	9355eu	9505na	11580eu		
0400	0500		Zambia, Christian Voice	6065af					
0400	0500	vi	Zambia, Radio ZNBC	4910do	6265al				
0403	0410		Croatia, Croatian Radio	9925na					
0427	0500	a	Madagascar, Radio VO Hope	12060af	15320af				
0430	0500		Netherlands, Radio	6165na	9590na				
0430	0500		Nigeria, Radio/Enugu	6025do					
0430	0500		Nigeria, Radio/Ibadan	6050do					
0430	0500		S Africa, AWR	11975af					
0430	0500		Sri Lanka, SLBC	6130do					
0430	0500		Swaziland, TWR	4775af					

0430 0500 mtwhfa Swaziland, TWR 3200af
 0430 0500 UK, BBC World Service 6010eu 9815eu 13645me 21735me
 0445 0500 Italy, RAI Intl 7235af 9875af
 0459 0500 New Zealand, Radio NZ Intl 11820pa

0500 UTC - 1AM E / 12AM C / 10PM P

0500	0520		Vatican City, Vatican Radio	4005eu	5890eu	7250eu	9660af		
			11625af	15570af					
0500	0525	a	Madagascar, Radio VO Hope	12060af	15320af				
0500	0530	mtwhf	France Radio France Intl	11685af	17800af				
0500	0530	twfha	Mexico, Radio Mexico Intl	9705am	11770am				
0500	0530		Netherlands, Radio	6165na					
0500	0530		S Africa, AWR	5960af	6015af				
0500	0530		S Africa, Channel Africa	11710af					
0500	0530		Uganda, Radio	4976do	5026al	7195al			
0500	0545		Germany, Deutsche Welle	9670na	9785na	11985na			
0500	0600		Anguilla, Caribbean Beacon	6090am					
0500	0600		Australia, ABC NT Alice Springs	4835do					
0500	0600		Australia, ABC NT Katherine	5025do					
0500	0600		Australia, ABC NT Tennant Crk	4910do					
0500	0600		Australia, Radio	9660pa	12080pa	15240pa	15415as		
			15515pa	17580pa	17750as				
0500	0600	mtwhf	Bhutan, Bhutan BC Service	5030al	6035do				
0500	0600	vi	Botswana, Radio	3356do	4820do	7255do			
0500	0600	irr/vl	Cameroon, RTV	4850do					
0500	0600		Canada, CBC Northern Service	9625do					
0500	0600		Canada, CFRX Toronto ON	6070do					
0500	0600		Canada, CKZN St John's NF	6160do					
0500	0600		Canada, CKZU Vancouver BC	6160do					
0500	0600		China, China Radio Intl	9560na					
0500	0600		Costa Rica, R for Peace Intl	7455va	15050va				
0500	0600		Costa Rica, University Network	5030am	6150am	7375am	9725sa		
			11870am	13750na	17645as				
0500	0600		Cuba, Radio Havana	9550am	9665usb	9820na			
0500	0600		Ecuador, HCJB	9745na	11960na	21455usb			
0500	0600	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va				
0500	0600		Germany, Voice of Hope	15715me					
0500	0600		Guyana, Voice of	3290do	5950do				
0500	0600		Japan, Radio	5975eu	6110na	7230eu	11715as	11760as	
			13630na	15195as	17810as	21755pa			
0500	0600		Kenya, Kenya BC Corp	4885do	4935do				
0500	0600		Liberia, R Liberia Intl	6100do					
0500	0600		Malaysia, Radio	7295do					
0500	0600		Malaysia, RTM Kota Kinabalu	5979do					
0500	0600		Malaysia, Voice of	6175as	9750as	15295as			
0500	0600		Namibia, NBC	3270af	3290af				
0500	0600		New Zealand, Radio NZ Intl	11820pa					
0500	0600		Nigeria, Radio/Enugu	6025do					
0500	0600		Nigeria, Radio/Ibadan	6050do					
0500	0600		Nigeria, Radio/Kaduna	4770do	6090do	9570do			
0500	0600		Nigeria, Radio/Lagos	3326do	4990al				
0500	0600		Nigeria, Voice of	7255af					
0500	0600		Russia, University Network	17765as					
0500	0600		Russia, Voice of Russia	17635au	17685au	17795as	21790au		
0500	0600		Singapore, SBC Radio One	6150do					
0500	0600	vi	Solomon Islands, SIBC	5020do					
0500	0600		Sri Lanka, SLBC	6130do					
0500	0600		Swaziland, TWR	4775af	6035af	9500af			
0500	0600		UK, BBC World Service	6005af	6190af	6195eu	7160af	9410eu	
			9875eu	11675eu	11760me	11765af	11940af	11955as	12095eu
			15280as	15310as	15360as	15420af	17640as	17790as	17885af
			17790as	21735me					
0500	0600		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb		
			6458usb	10320usb	10940usb	12579usb	12689usb	13362usb	
0500									

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0520	0530	Vatican City, Vatican Radio	9660af	11625af	15570af
0525	0600	vi Ghana, Ghana BC Corp	3366do	4915do	
0530	0550	UAE, Emirates Radio	15435au	17830au	21695au
0530	0600	vi Italy, IRRS 13840va			
0530	0600	S Africa, AWR	15105af		
0530	0600	Thailand, Radio	21795eu		
0532	0600	Austria, Radio Austria Intl	6155eu	13730eu	17870me

0600 UTC - 2AM E / 1AM C / 11PM P

0600	0615	S Africa TWR	11640af		
0600	0630	mtwhf France Radio France Intl	11710af	17800af	21620af
0600	0630	vi Italy, IRRS 13840va			
0600	0630	S Africa, AWR	15105af		
0600	0630	vi S Africa, Channel Africa	15215af		
0600	0630	Zimbabwe, ZBC Corp	5975do		
0600	0645	Germany, Deutsche Welle	6140eu	11925af	13790af 17860af
0600	0658	New Zealand, Radio NZ Intl	11820pa		
0600	0700	Anguilla, Caribbean Beacon	6090am		
0600	0700	Australia, ABC NT Alice Springs	4835do		
0600	0700	Australia, ABC NT Katherine	5025do		
0600	0700	Australia, ABC NT Tennant Crk	4910do		
0600	0700	Australia, Radio	9660pa	12080pa	15240pa 15415as
0600	0700	15515pa 17580pa	17750as		
0600	0700	vi Botswana, Radio	4820do	7255do	
0600	0700	irrg/vl Cameroon, RTV	4850do		
0600	0700	Canada, CFRX Toronto ON	6070do		
0600	0700	Canada, CFVP Calgary AB	6030do		
0600	0700	Canada, CKZN St John's NF	6160do		
0600	0700	Canada, CKZU Vancouver BC	6160do		
0600	0700	Costa Rica, R for Peace Intl	7455va		
0600	0700	Costa Rica, University Network	5030am	6150am	7375am 9725sa
0600	0700	11870am 13750na	17645as		
0600	0700	Cuba, Radio Havana	9550am	9820na	
0600	0700	Ecuador, HCJB	11680eu		
0600	0700	a/monthly Finland, Scandv Weekend Radio	6170va	11720va	
0600	0700	vi Ghana, Ghana BC Corp	3366do	4915do	
0600	0700	Guyana, Voice of	3290do	5950do	
0600	0700	Japan, Radio	7230eu	11740as	13630na 15195as
0600	0700	17870pa 21755pa			
0600	0700	irreg Kenya, Kenya BC Corp	4885do	4935do	
0600	0700	Liberia, ELWA	4760do		
0600	0700	Liberia, R Liberia Intl	6100do		
0600	0700	Malaysia, Radio	7295do		
0600	0700	Malaysia, Voice of	6175as	9750as	15295as
0600	0700	Namibia, NBC	3270af	3290af	
0600	0700	Nigeria, Radio/Enugu	6025do		
0600	0700	Nigeria, Radio/Ibadan	6050do		
0600	0700	Nigeria, Radio/Kaduna	4770do	6090do	9570do
0600	0700	Nigeria, Radio/Lagos	3326do	4990al	
0600	0700	Nigeria, Voice of	7255af		
0600	0700	Romania, R Romania Intl	9635na	11940na	
0600	0700	Russia, University Network	17765as		
0600	0700	Russia, Voice of Russia	15490au	17635au	17685au 17795as
0600	0700	21790au			
0600	0700	Sierra Leone, SLBS	3316do		
0600	0700	Singapore, SBC Radio One	6150do		
0600	0700	vi Solomon Islands, SIBC	5020do		
0600	0700	Swaziland, TWR	4775af	6035af	9500af
0600	0700	UK, BBC World Service	6055af	6190af	9410eu 11765af 11940af
0600	0700	11955as 12095eu	15310as	15360as	15485eu 15565eu 17640as
0600	0700	17760af 17790as	17885af	21660as	
0600	0700	mtwhf UK, BBC World Service	15400af	15575me	
0600	0700	USA, Armed Forces Network	4319usb	4993usb	5765usb 6350usb
0600	0700	6458usb 10320usb	10940usb	12579usb	12689usb 13362usb
0600	0700	USA, KAUJ Dallas TX	5755va		
0600	0700	USA, KTBK Salt Lk City UT	7505na		
0600	0700	USA, KWHR Naalehu HI	11565as		
0600	0700	USA, Voice of America	5970af	6035af	6080af 7195af 9530va
0600	0700	9760va 11965va	11995af	12080af	13670af 15205va
0600	0700	USA, WENW Birmingham AL	5825na	7425na	15745na
0600	0700	USA, WHRA Greenbush ME	11730va		
0600	0700	USA, WHRI Noblesville IN	5745va	7315am	
0600	0700	USA, WJIE Louisville KY	7490am	13595am	
0600	0700	USA, WMLK Bethel PA	9465eu		
0600	0700	USA, WRMI Miami FL	7385am		
0600	0700	USA, WRNO New Orleans LA	7395am		
0600	0700	USA, WSHB Cypress Creek SC	9455sa	11550am	
0600	0700	USA, WTJC Newport NC	9370na		
0600	0700	USA, WWCR Nashville TN	3210na	5070na	5935na 7560na
0600	0700	USA, WWRB Manchester TN	6890va		
0600	0700	USA, WYFR Okeechobee FL	7355eu	11580eu	
0600	0700	vi Vanuatu, Radio	4960do	7260do	
0600	0700	Yemen, Rep of Yemen Radio	9780me		
0600	0700	Zambia, Christian Voice	9865af		
0600	0700	vi Zambia, Radio ZNBC	4910do	6265al	

0630	0700	Ecuador, HCJB	21455usb		
0630	0700	Georgia, Georgian Radio	11805eu		
0630	0700	Vatican City, Vatican Radio	11625af	13765af	15570af
0637	0656	Romania, R Romania Intl	7105eu	9625eu	9550eu 11775eu
0645	0655as	Monaco, TWR	9870eu		
0645	0700	Germany, Deutsche Welle	6140eu		
0645	0700as	Germany, TWR	6045eu		
0655	0700	Germany, TWR	6045eu		
0655	0700	Monaco, TWR	9870eu		
0659	0700	New Zealand, Radio NZ Intl	9885pa		

0700 UTC - 3AM E / 2AM C / 12AM P

0700	0704	vi Pakistan, Radio	17520as	21465as	
0700	0725	Belgium, RVI Flanders R Intl	5985eu		
0700	0727	Czech Rep, Radio Prague Intl	9880eu	11600eu	
0700	0730	Austria, AWR	7230va		
0700	0730	Slovakia, R Slovakia Intl	9440va	15460va	17550va
0700	0750	Germany, TWR	6045eu		
0700	0750	Monaco, TWR	9870eu		
0700	0750	Swaziland, TWR	4775af	6035af	9500af
0700	0800	Anguilla, Caribbean Beacon	6090am		
0700	0800	Australia, ABC NT Alice Springs	4835do		
0700	0800	Australia, ABC NT Katherine	5025do		
0700	0800	Australia, ABC NT Tennant Crk	4910do		
0700	0800	Australia, Radio	9660pa	12080pa	15240pa 15415as
0700	0800	17580pa 17750as	21725as		
0700	0800	vi Botswana, Radio	4820do	7255do	
0700	0800	irrg/vl Cameroon, RTV	4850do		
0700	0800	Canada, CFRX Toronto ON	6070do		
0700	0800	Canada, CFVP Calgary AB	6030do		
0700	0800	Canada, CKZN St John's NF	6160do		
0700	0800	Canada, CKZU Vancouver BC	6160do		
0700	0800	Costa Rica, R for Peace Intl	7455va		
0700	0800	Costa Rica, University Network	5030am	6150am	7375am 9725sa
0700	0800	11870am 13750na	17645as		
0700	0800	Ecuador, HCJB	11680eu	11755pa	21455usb
0700	0800	mtwhf Eqt Guinea, Radio Africa		15185af	
0700	0800	as/vl Eqt. Guinea, Radio East Africa		15185af	
0700	0800	a/monthly Finland, Scandv Weekend Radio	6170va	11720va	
0700	0800	mtwhf France Radio France Intl	15605af		
0700	0800	Germany, Deutsche Welle	6140eu		
0700	0800	Germany, Voice of Hope	5975eu		
0700	0800	vi Ghana, Ghana BC Corp	3366do	4915do	
0700	0800	Guyana, Voice of	3290do	5950do	
0700	0800	Kenya, Kenya BC Corp	4885do	4935do	
0700	0800	irreg Liberia, ELWA	4760do		
0700	0800	Liberia, R Liberia Intl	6100do		
0700	0800	Malaysia, Radio	7295do		
0700	0800	Malaysia, RTM Kota Kinabalu	5979do		
0700	0800	Malaysia, Voice of	6175as	9750as	15295as
0700	0800	Myanmar, Radio	9730do		
0700	0800	New Zealand, Radio NZ Intl	9885pa		
0700	0800	Nigeria, Radio/Enugu	6025do		
0700	0800	Nigeria, Radio/Ibadan	6050do		
0700	0800	Nigeria, Radio/Kaduna	4770do	6090do	9570do
0700	0800	Nigeria, Radio/Lagos	3326do	4990al	
0700	0800	Palau, KHBN/VO Hope	9965as	9985as	15725as
0700	0800	Papua New Guinea, NBC	4890do	9675al	
0700	0800	Romania, R Romania Intl	21530af		
0700	0800	Russia, University Network	17765as		
0700	0800	Russia, Voice of Russia	15490au	17495au	17525au 17635au 17675as
0700	0800	17685au 17795as			
0700	0800	Sierra Leone, SLBS	3316do		
0700	0800	Singapore, SBC Radio One	6150do		
0700	0800	vi Solomon Islands, SIBC	5020do		
0700	0800	Sri Lanka, SLBC	6130do		
0700	0800	Taiwan, R Taipei Intl	5950na		
0700	0800	UK, BBC World Service	6190af	11760me	11765af 11940af 11955as
0700	0800	12095eu 15310as	15360as	15400af	15565eu 17640af 17760as
0700	0800	17790as 17885af	21660as	21735me	
0700	0800	USA, Armed Forces Network	4319usb	4993usb	5765usb 6350usb
0700	0800	6458usb 10320usb	10940usb	12579usb	12689usb 13362usb
0700	0800	USA, KAUJ Dallas TX	5755va		
0700	0800	USA, KTBK Salt Lk City UT	7505na		
0700	0800	USA, KWHR Naalehu HI	11565as		
0700	0800	USA, WENW Birmingham AL	5825na	7425na	15745na
0700	0800	USA, WHRA Greenbush ME	11730va		
0700	0800	USA, WHRI Noblesville IN	5745va	7315am	
0700	0800	USA, WJIE Louisville KY	7490am	13595am	
0700	0800	USA, WMLK Bethel PA	9465eu		
0700	0800	USA, WRNO New Orleans LA	7395am		
0700	0800	USA, WSHB Cypress Creek SC	9455sa	11550am	
0700	0800	USA, WTJC Newport NC	9370na		
0700	0800	USA, WWCR Nashville TN	3210na	5070na	5935na 7560na
0700	0800	USA, WWRB Manchester TN	6890va		

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0700	0800		USA, WYFR Okeechobee FL	7355eu	13695af	15170af
0700	0800	vl	Vanuatu, Radio	4960do	7260do	
0700	0800		Zambia, Christian Voice	9865af		
0700	0800	vl	Zambia, Radio ZNBC	4910do	6265al	
0715	0800		Guam, TWR 11850as	11980as		
0730	0800	th	Georgia, Georgian Radio	6080me		
0730	0800		Switzerland, Swiss R Intl	15445af	21750af	
0730	0800	as	UK, BBC World Service	15575as		
0750	0800	smtwhf	Germany, TWR	6045eu		
0750	0800	smtwhf	Monaco, TWR	9870eu		

0800 UTC - 4AM E / 3AM C / 1AM P

0800	0815		Guam, TWR 15215as			
0800	0820	smtwhf	Germany, TWR	6045eu		
0800	0820	smtwhf	Monaco, TWR	9870eu		
0800	0830	s	Armenia, Voice of	15270eu		
0800	0830		Australia, ABC NT Alice Springs	4835do		
0800	0830		Australia, ABC NT Katherine	5025do		
0800	0830		Australia, ABC NT Tennant Crk	4910do		
0800	0830		Malaysia, RTM Kota Kinabalu	5979do		
0800	0830		Malaysia, Voice of	6175as	15295as	
0800	0830		Myanmar, Radio	9730do		
0800	0900		Anguilla, Caribbean Beacon	6090am		
0800	0900		Australia, Radio	5995pa	9710pa	12080pa 15240as
			15415as 21725as			
0800	0900	mtwhf	Bhutan, Bhutan BC Service	5030al	6035do	
0800	0900	vl	Botswana, Radio	4820do	7255do	
0800	0900	irr/vl	Cameroon, RTV	4850do		
0800	0900		Canada, CFRX Toronto ON	6070do		
0800	0900		Canada, CFVP Calgary AB	6030do		
0800	0900		Canada, CKZN St John's NF	6160do		
0800	0900		Canada, CKZU Vancouver BC	6160do		
0800	0900		Costa Rica, R for Peace Intl	7455va		
0800	0900		Costa Rica, University Network	5030am	6150am	7375am 9725sa
			11870am 13750na 17645as			
0800	0900		Ecuador, HCJB	11755pa	21455usb	
0800	0900	mtwhf	Eqt Guinea, Radio Africa	15185af		
0800	0900	as/vl	Eqt. Guinea, Radio East Africa	15185af		
0800	0900	a/monthly	Finland, Scandv Weekend Radio	6170va	11690va	
0800	0900		Germany, Deutsche Welle	6140eu		
0800	0900	a	Germany, Remnants Hope Minstr	13810as		
0800	0900	vl	Ghana, Ghana BC Corp	3366do	4915do	
0800	0900		Guyana, Voice of	3290do	5950do	
0800	0900		Indonesia, Voice of	9525pa	11785al	15150as
0800	0900	as/vl	Italy, IRRS 13840a			
0800	0900		Kenya, Kenya BC Corp	4885do	4935do	
0800	0900	irr/vl	Liberia, ELWA	4760do		
0800	0900		Liberia, R Liberia Intl	6100do		
0800	0900		Malaysia, Radio	7295do		
0800	0900	vl/s	Malta, VO Mediterranean	9605eu		
0800	0900		New Zealand, Radio NZ Intl	9885pa		
0800	0900		Nigeria, Radio/Enugu	6025do		
0800	0900		Nigeria, Radio/Ibadan	6050do		
0800	0900		Nigeria, Radio/Kaduna	4770do	6090do	9570do
0800	0900		Nigeria, Radio/Lagos	3326do	4990al	
0800	0900		Nigeria, Voice of	7255af		
0800	0900		Palau, KHBN/VO Hope	9965as	9985as	15725as
0800	0900		Papua New Guinea, NBC	4890do	9675al	
0800	0900		Russia, University Network	17765as		
0800	0900		Russia, Voice of Russia	15490au	17495au	17675as 17685au 17795as
0800	0900		Singapore, SBC Radio One	6150do		
0800	0900		South Korea, R Korea Intl	9570om	13670eu	
0800	0900		Sri Lanka, SLBC	6130do		
0800	0900		UK, BBC World Service	6190af	9410eu	11940af 11955as 12095eu
			15310as 15360eu 15485eu	15565eu	17640af	17760as 17885af
			21470af 21660as 21735me			
0800	0900	mtwhf	UK, BBC World Service	15400af	17830af	
0800	0900		USA, Armed Forces Network	4319usb	4993usb	5765usb 6350usb
			6458usb 10320usb 10940usb	12579usb	12689usb	13362usb
0800	0900		USA, KAUJ Dallas TX	5755va		
0800	0900		USA, KNLS Anchor Point AK	11765as		
0800	0900		USA, KTBN Salt Lk City UT	7505na		
0800	0900		USA, KWHR Naalehu HI	11565as	17780as	
0800	0900		USA, Voice of America	11930va	13610va	15190va
0800	0900		USA, WEWN Birmingham AL	5825na	7425na	15745na
0800	0900		USA, WHRI Noblesville IN	5745va	7315am	
0800	0900		USA, WJIE Louisville KY	7490am	13595am	
0800	0900		USA, WMLK Bethel PA	9465eu		
0800	0900		USA, WRMI Miami FL	7385am		
0800	0900		USA, WRNO New Orleans LA	7395am		
0800	0900		USA, WSHB Cypress Creek SC	9845au	9860eu	11550am
0800	0900		USA, WTJC Newport NC	9370na		
0800	0900		USA, WWCN Nashville TN	3210na	5070na	5935na 7560na
0800	0900		USA, WYFR Okeechobee FL	13570af		
0800	0900	vl	Vanuatu, Radio	4960do	7260do	

0800	0900		Zambia, Christian Voice	9865af		
0815	0900		Guam, TWR 15215as	15330as		
0830	0900		Australia, ABC NT Katherine	2485do		
0830	0900		Australia, ABC NT Tennant Crk	2325do		
0830	0900		Austria, AWR	17780af		
0830	0900		Georgia, Georgian Radio	11910eu		
0830	0900		Greece, Voice of	15630eu	17905eu	
0830	0900	vl	Solomon Islands, SIBC	5020do		
0830	0900		Switzerland, Swiss R Intl	21770af		
0840	0850		Turkmenistan, Turkmen Radio	5015as		

0900 UTC - 5AM E / 4AM C / 2AM P

0900	0915	mtwhf/vl	Solomon Islands, SIBC	5020do		
0900	0929		Czech Rep, Radio Prague Intl		21745va	
0900	0930		Austria, AWR	17780af		
0900	0930		Guam, TWR 15330as			
0900	0930	irr/vl	Liberia, ELWA	4760do		
0900	0945		Germany, Deutsche Welle	6140eu	6160va	9510am 12035af
			15410af 15470as 17715as	17770pa	17800af	17820as 21560af
			21780af 21790pa			
0900	1000		Anguilla, Caribbean Beacon	6090am		
0900	1000		Australia, ABC NT Katherine	2485do		
0900	1000		Australia, ABC NT Tennant Crk	2325do		
0900	1000		Australia, Radio	9580va	11880as	15240as 17750as 21820as
0900	1000		Australia, Voice International	13685as	17645as	
0900	1000	vl	Botswana, Radio	4820do	7255do	
0900	1000	irr/vl	Cameroon, RTV	4850do		
0900	1000		Canada, CFRX Toronto ON	6070do		
0900	1000		Canada, CFVP Calgary AB	6030do		
0900	1000		Canada, CKZN St John's NF	6160do		
0900	1000		Canada, CKZU Vancouver BC	6160do		
0900	1000		China, China Radio Intl	11730pa	15210pa	
0900	1000		Costa Rica, R for Peace Intl	7455va		
0900	1000		Costa Rica, University Network	5030am	6150am	7375am 9725sa
			11870am 13750na 17645as			
0900	1000		Ecuador, HCJB	11755pa	21455usb	
0900	1000	mtwhf	Eqt Guinea, Radio Africa	15185af		
0900	1000	as/vl	Eqt. Guinea, Radio East Africa	15185af		
0900	1000	a/monthly	Finland, Scandv Weekend Radio	6170va	11690va	
0900	1000		Germany, Voice of Hope	21590me		
0900	1000	vl	Ghana, Ghana BC Corp	4915do		
0900	1000		Guyana, Voice of	3290do	5950do	
0900	1000	as/vl	Italy, IRRS 13840a			
0900	1000		Kenya, Kenya BC Corp	4885do	4935do	
0900	1000		Liberia, R Liberia Intl	6100do		
0900	1000		Malaysia, Radio	7295do		
0900	1000		New Zealand, Radio NZ Intl		9885pa	
0900	1000		Nigeria, Radio/Enugu	6025do		
0900	1000		Nigeria, Radio/Ibadan	6050do		
0900	1000		Nigeria, Radio/Kaduna	4770do	6090do	9570do
0900	1000		Nigeria, Radio/Lagos	3326do	4990al	
0900	1000		Palau, KHBN/VO Hope	9965as	9985as	15725as
0900	1000		Papua New Guinea, NBC	4890do	9675al	
0900	1000		Russia, University Network	17765as		
0900	1000		Sierra Leone, SLBS	3316do		
0900	1000		Singapore, SBC Radio One	6150do		
0900	1000	as/vl	Solomon Islands, SIBC	5020do		
0900	1000		Sri Lanka, SLBC	6130do		
0900	1000		UK, BBC World Service	6190af	6195eu	9605as 9740as
			11760me 11940af 11945as	12095eu	15310as	15360as 15485eu
			15565eu 17640af 17760as	17790as	21470af	21735me
0900	1000	mtwhf	UK, BBC World Service	15190sa	17830af	
0900	1000		USA, Armed Forces Network	4319usb	4993usb	5765usb 6350usb
			6458usb 10320usb 10940usb	12579usb	12689usb	13362usb
0900	1000		USA, KAUJ Dallas TX	5755va		
0900	1000		USA, KTBN Salt Lk City UT	7505na		
0900	1000		USA, KWHR Naalehu HI	11565as	17780as	
0900	1000		USA, Voice of America	11930va	13610va	15190va
0900	1000		USA, WEWN Birmingham AL	5825na	7425na	15745na
0900	1000		USA, WHRA Greenbush ME	11730va		
0900	1000		USA, WHRI Noblesville IN	5745va	7315am	
0900	1000		USA, WJIE Louisville KY	7490am	13595am	
0900	1000		USA, WRMI Miami FL	9955am		
0900	1000		USA, WSHB Cypress Creek SC	9455sa	9860eu	11550am
0900	1000		USA, WTJC Newport NC	9370na		
0900	1000		USA, WWCN Nashville TN	5070na	5935na	7560na 9475na
0900	1000	vl	Vanuatu, Radio	4960do		
0900	1000	mtwhf	Vatican City, Vatican Radio	5890eu		
0900	1000		Zambia, Christian Voice	9865af		
0930	0950		Greece, Voice of	15630eu	17900eu	
0930	1000		Georgia, Georgian Radio	11910me		
0930	1000	mtwhf	Guam, TWR 15330as			
0930	1000		Lithuania, R Vilnius	9710eu		
0930	1000		Netherlands, Radio	9790pa	12065as	13710as
0945	1000		Germany, Deutsche Welle	6140eu		
0945	1000	mtwhf/vl	Solomon Islands, SIBC	5020do		

Shortwave Guide



1000 UTC - 6AM E / 5AM C / 3AM P

1000	1005	vi	Pakistan, Radio	17520as	21465as			
1000	1027		Vietnam, Voice of	9840au	12020au			
1000	1030		Guam, AWR	11560as	11930as			
1000	1030		Mongolia, Voice of	12015as				
1000	1030		Netherlands, Radio	9790pa	12065as	13710as		
1000	1030		Sri Lanka, SLBC	4940do				
1000	1030		UK, RTE Radio	15280au				
1000	1056		North Korea, Voice of	9335ca	11710ca	11735as	13650as	
1000	1100		Anguilla, Caribbean Beacon	6090am				
1000	1100		Australia, ABC NT Katherine	2485do				
1000	1100		Australia, ABC NT Tennant Crk	2325do				
1000	1100		Australia, Radio	9580va	11880as	15240as	17750as	21820as
1000	1100		Australia, Voice International	13685as				
1000	1100	as	Bhutan, Bhutan BC Service	5030al	6035do			
1000	1100	vi	Botswana, Radio	4820do	7255do			
1000	1100	irr/vl	Cameroon, RTV	4850do				
1000	1100		Canada, CFRX Toronto ON	6070do				
1000	1100		Canada, CFVP Calgary AB	6030do				
1000	1100		Canada, CKZN St John's NF	6160do				
1000	1100		Canada, CKZU Vancouver BC	6160do				
1000	1100		China, China Radio Intl	11730pa	15210pa			
1000	1100		Costa Rica, R for Peace Intl	7455va				
1000	1100		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na 17645as					
1000	1100		Ecuador, HCJB	11755pa	21455usb			
1000	1100	mtwhf	Eqt. Guinea, Radio Africa	15185af				
1000	1100	as/vl	Eqt. Guinea, Radio East Africa	15185af				
1000	1100	a/monthly	Finland, Scandv Weekend Radio	6170va	11690va			
1000	1100		Germany, Deutsche Welle	6140eu				
1000	1100	vi	Ghana, Ghana BC Corp	4915do				
1000	1100		Guyana, Voice of	3290do	5950do			
1000	1100		India, All India Radio	11585as	13695au	15020as	15260as	
			17510au 17800au 17895au					
1000	1100	as/vl	Italy, IRRS	13840va				
1000	1100		Japan, Radio	9695as	15590as	21755pa		
1000	1100		Liberia, R Liberia Intl	6100do				
1000	1100		Malaysia, Radio	7295do				
1000	1100		New Zealand, Radio NZ Intl	9885pa				
1000	1100		Nigeria, Radio/Enugu	6025do				
1000	1100		Nigeria, Radio/Ibadan	6050do				
1000	1100		Nigeria, Radio/Kaduna	4770do	6090do	9570do		
1000	1100		Nigeria, Radio/Lagos	3326do	4990al			
1000	1100		Nigeria, Voice of	7255af				
1000	1100		Palau, KHBN/VO Hope	9965as	12160as	15725as		
1000	1100		Papua New Guinea, NBC	4890do	9675al			
1000	1100		Russia, University Network	17765as				
1000	1100		Singapore, SBC Radio One	6150do				
1000	1100	vi	Solomon Islands, SIBC	5020do				
1000	1100		UK, BBC World Service	6190af	6195va	9605as	9740as	
			11760me 11945af 12095eu		15280as	15310as	15335as	15360as
			15485eu 15565eu 15575as		17640af	17790as	17885af	21730af
			21470as 21660as					
1000	1100		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
			6458usb 10320usb 10940usb	12579usb	12689usb	13362usb		
1000	1100		USA, KAUJ Dallas TX	5755va				
1000	1100		USA, KTBN Salt Lk City UT	7505na				
1000	1100		USA, KWHR Naalehu HI	9930as	11565pa			
1000	1100		USA, Voice of America	5745am	7370am	9590am	9770va	15240va
			15425va					
1000	1100		USA, WEWN Birmingham AL	7425na	7520na	9465na	15405eu	
			15745eu					
1000	1100		USA, WHRI Noblesville IN	6040na	9495am			
1000	1100	as	USA, WINB Red Lion PA	13570am				
1000	1100		USA, WJIE Louisville KY	7490am	13595am			
1000	1100		USA, WRMI Miami FL	9955am				
1000	1100		USA, WRNO New Orleans LA	7395am				
1000	1100		USA, WSHB Cypress Creek SC	6095am	9455am			
1000	1100		USA, WTJC Newport NC	9370na				
1000	1100		USA, WWCN Nashville TN	15825na	5070na	5935na	7560na	
			15825na					
1000	1100		USA, WYFR Okeechobee FL	5950na				
1030	1035	mtwhf	Israel, Kol Israel	15640va	17545va			
1030	1045		Ethiopia, Radio	5990do	7110do	9704do		
1030	1057		Czech Rep, Radio Prague Intl	9880eu	11615eu			
1030	1100		Guam, AWR	11560as				
1030	1100		Netherlands, Radio	5965na	6045eu	9790pa	9860eu	12065as
			13710as					
1030	1100		Sri Lanka, SLBC	4940do	11835as	15120as	17850as	
1030	1100		UAE, Emirates Radio	13675eu	15370eu	15400eu	21597eu	

1100 UTC - 7AM E / 6AM C / 4AM P

1100	1105		New Zealand, Radio NZ Intl	9885pa				
1100	1120	fa	Kazakhstan, R Almaty	9620eu	11840eu			
1100	1127		Vietnam, Voice of	7285as				
1100	1130	as	Bhutan, Bhutan BC Service	5030al	6035do			
1100	1130		Netherlands, Radio	5965na	6045eu	9790pa	9860eu	12065as
			13710as					
1100	1130		Sri Lanka, SLBC	4940do	11835as	15120as	17850as	
1100	1130	mtwhf	UK, BBC World Service	15220am				
1100	1130		UK, BBC World Service	15400af	17790as			
1100	1145		Germany, Deutsche Welle	6140eu	11785af	15410af	17860af	
			21525af 21665af					
1100	1200		Anguilla, Caribbean Beacon	11775am				
1100	1200		Australia, ABC NT Katherine	2485do				
1100	1200		Australia, ABC NT Tennant Crk	2325do				
1100	1200		Australia, Radio	5995pa	6020pa	9475as	9580pa	
			11650pa 11880as 12080pa	15240as	21820as			
1100	1200		Australia, Voice International	13685as				
1100	1200	vi	Austria, Radio Africa Intl	17815eu				
1100	1200		Bulgaria, Radio	15700eu	17500eu			
1100	1200		Canada, CFRX Toronto ON	6070do				
1100	1200		Canada, CFVP Calgary AB	6030do				
1100	1200		Canada, CKZN St John's NF	6160do				
1100	1200		Canada, CKZU Vancouver BC	6160do				
1100	1200		Costa Rica, R for Peace Intl	7455va				
1100	1200		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na 17645as					
1100	1200		Ecuador, HCJB	12005am	15115na	21455usb		
1100	1200	mtwhf	Eqt. Guinea, Radio Africa	15185af				
1100	1200	as/vl	Eqt. Guinea, Radio East Africa	15185af				
1100	1200	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va			
1100	1200	vi	Ghana, Ghana BC Corp	4915do				
1100	1200		Guyana, Voice of	3290do	5950do			
1100	1200		Iran, VOIRI	15215as	15585as	15600as	21470as	21730au
1100	1200	as/vl	Italy, IRRS	13840va				
1100	1200		Japan, Radio	6120na	9695as	15590as		
1100	1200		Jordan, Radio	11690eu				
1100	1200		Malaysia, Radio	7295do				
1100	1200		Palau, KHBN/VO Hope	9965as	9985as	12160as	13840as	
1100	1200		Papua New Guinea, NBC	4890do	9675al			
1100	1200		Russia, University Network	17765as				
1100	1200		Singapore, R Singapore Intl	6150as	9600as			
1100	1200		Taiwan, R Taipei Intl	7445as	11985as			
1100	1200		UK, BBC World Service	6190af	6195va	9605as	9740as	
			11760me 11945as 12095eu	12105sa	15190va	15220am	15280as	
			15310as 15400af 15485eu	15565eu	15575as	17640af	17700eu	
			17760as 17830af 17885af	21470af	21660as			
1100	1200		Ukraine, R Ukraine Intl	11840na	15520na			
1100	1200		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
			6458usb 10320usb 10940usb	12579usb	12689usb	13362usb		
1100	1200		USA, KAUJ Dallas TX	5755va				
1100	1200		USA, KTBN Salt Lk City UT	7505na				
1100	1200		USA, KWHR Naalehu HI	9930as	11565pa			
1100	1200		USA, Voice of America	6160va	9645va	9760va	9770va	15190va
			15240va 15425va					
1100	1200		USA, WEWN Birmingham AL	7425na	7520na	9465na	15405eu	
			15745eu					
1100	1200		USA, WHRI Noblesville IN	6040na	9495am			
1100	1200		USA, WINB Red Lion PA	13570am				
1100	1200		USA, WJIE Louisville KY	7490am	13595am			
1100	1200		USA, WRMI Miami FL	9955am				
1100	1200		USA, WRNO New Orleans LA	7395am				
1100	1200		USA, WSHB Cypress Creek SC	6095am	9455am	11660am		
1100	1200		USA, WTJC Newport NC	9370na				
1100	1200		USA, WWCN Nashville TN	15825na	5070na	5935na	7560na	
			15825na					
1100	1200		USA, WYFR Okeechobee FL	5850na	5950na	11725sa		
1106	1200		New Zealand, Radio NZ Intl	9515pa				
1115	1145		Nepal, Radio	3230as	5005as			
1120	1140	w	Kazakhstan, R Almaty	9620eu	11840eu			
1130	1145	vi	Libya, Voice of Africa	15435irr	17750irr			
1130	1155		Belgium, RVI Flanders R Intl	9865as				
1130	1200		Austria, Radio Austria Intl	6155eu	13730eu	21780as		
1130	1200		Netherlands, Radio	5965na	6045eu	9860eu		
1130	1200		South Korea, R Korea Intl	9650na				
1130	1200		Sri Lanka, SLBC	4940do				
1130	1200		Sweden, Radio	17505va	18960na			
1130	1200	mtwhf	UK, BBC World Service	11835am	15190sa			
1130	1200	f	Vatican City, Vatican Radio	15595va	17515va			
1140	1200	t	Kazakhstan, R Almaty	9620eu	11840eu			
1145	1200		Germany, Deutsche Welle	6140eu				
1155	1200	vi	Zimbabwe, ZBC Corp	5975do				

Shortwave Guide

MT

1200 UTC - 8AM E / 7AM C / 5AM P

1200	1215	UK, BBC World Service	7135af				
1200	1225	Netherlands, Radio	5965na	6045eu	9860eu		
1200	1230	France Radio France Intl	15540af	25820af			
1200	1230	Iran, VOIRI	15215as	15585as	15600as	21470as	21730au
1200	1230	Mongolia, Voice of	12015eu				
1200	1230	South Korea, R Korea Intl		9650na			
1200	1230	Uzbekistan, Radio Tashkent		5975as	7285as	9715as	15295as
		17775as					
1200	1230	vi Zimbabwe, ZBC Corp	5975do				
1200	1259	Poland, Radio Polonia	6095eu	9525eu	11820eu		
1200	1300	Anguilla, Caribbean Beacon		11775am			
1200	1300	Australia, ABCNT Katherine		2485do			
1200	1300	Australia, ABCNT Tennant Crk		2325do			
1200	1300	Australia, Radio	5995pa	6020pa	9475as	9580pa	
		11650pa	11880as	21820as			
1200	1300	Australia, Voice International		13685as			
1200	1300	Bangladesh, Bangla Betar		7185as	9550as		
1200	1300	Canada, CBC Northern Service		9625do			
1200	1300	Canada, CFRX Toronto ON		6070do			
1200	1300	Canada, CFVP Calgary AB		6030do			
1200	1300	Canada, CKZN St John's NF		6160do			
1200	1300	Canada, CKZU Vancouver BC		6160do			
1200	1300	Canada, Radio Canada Intl		9660as	15190as		
1200	1300	Canada, Radio Canada Intl		9515na	13655na	17820na	
1200	1300	China, China Radio Intl	9730as	9760as	11760pa	11855pa	11980as
		15415pa					
1200	1300	China, Voice of Hope	7485as				
1200	1300	Costa Rica, R for Peace Intl		21815usb			
1200	1300	Costa Rica, University Network		5030am	6150am	7375am	9725sa
		11870am	13750na	17645as			
1200	1300	Ecuador, HCJB	12005am	15115na	21455usb		
1200	1300	a/monthly Finland, Scandv Weekend Radio		5990va	11720va		
1200	1300	Germany, Deutsche Welle		6140eu			
1200	1300	Germany, Overcomer Ministries		5975eu			
1200	1300	as Germany, Remnants Hope Minstr		6110eu			
1200	1300	Guyana, Voice of	3290do	5950do			
1200	1300	Jordan, Radio	11690eu				
1200	1300	Malaysia, Radio	7295do				
1200	1300	New Zealand, Radio NZ Intl		9515pa			
1200	1300	Palau, KHBH/VO Hope	9965as	9985as	12160as	13840as	
1200	1300	Papua New Guinea, NBC		4890do	9675al		
1200	1300	mtwhfa Russia, University Network		17765as			
1200	1300	Russia, Voice of Hope	13590as				
1200	1300	Singapore, R Singapore Intl		6150as	9600as		
1200	1300	Taiwan, R Taipei Intl	7130as	9610au			
1200	1300	UK, BBC World Service	6190af	6195va	9605as	9740as	
1200	1300	11760me	11945as	12095eu	15190va	15310as	15280as
1200	1300	15565eu	15575as	17640af	17700eu	17760as	17830af
1200	1300	21660as					
1200	1300	USA, Armed Forces Network		4319usb	4993usb	5765usb	6350usb
		6458usb	10320usb	10940usb	12579usb	12689usb	13362usb
1200	1300	USA, KALJ Dallas TX		13815va			
1200	1300	USA, KTBH Salt Lk City UT		7505na			
1200	1300	USA, KWHR Naalehu HI	9930as	11565pa			
1200	1300	USA, Voice of America	6160va	9645va	9760va	15160va	15240va
		15425va					
1200	1300	USA, WEWN Birmingham AL		9465na	11550na	11875na	15405eu
		15745eu					
1200	1300	USA, WHRI Noblesville IN		6040na	9495am		
1200	1300	USA, WINB Red Lion PA	13570am				
1200	1300	USA, WJIE Louisville KY	7490am	13595am			
1200	1300	USA, WRMI Miami FL	15725am				
1200	1300	USA, WRNO New Orleans LA		7395am			
1200	1300	USA, WSHB Cypress Creek SC		6095am	9455am	11660am	
1200	1300	USA, WTJC Newport NC	9370na				
1200	1300	USA, WWCR Nashville TN		7560na	12160na	13845na	
		15825na					
1200	1300	USA, WYFR Okeechobee FL		5850na	5950na	13695na	
		17750na					
1230	1257	mtwhfa Vietnam, Voice of	9840as	12020as			
1230	1300	Finland, YLE/Radio Finland		15400na	17670na		
1230	1300	Sri Lanka, SLBC	4940do	6005as	6075as	9770as	15425as
1230	1300	Sweden, Radio	17505va	18960na	21530as		
1230	1300	Thailand, Radio	9885va				
1230	1300	Turkey, Voice of	17615as	17830eu			
1230	1300	a UK, Wales Radio Intl	17845au				
1245	1300	tfa Seychelles, FEBA Radio	15535me				

1300 UTC - 9AM E / 8AM C / 6AM P

1300	1305	New Zealand, Radio NZ Intl	9515pa				
1300	1310	mtwhfa Turkmenistan, Turkmen Radio		5015as			

1300	1330	Guam, AWR	15385as				
1300	1330	Turkey, Voice of	17615as	17830eu			
1300	1330	UAE, AWR	17740as				
1300	1356	North Korea, Voice of	9335eu	11710na	13760eu	15244eu	
1300	1357	Czech Rep, Radio Prague Intl		13580eu	21735as		
1300	1400	Anguilla, Caribbean Beacon		11775am			
1300	1400	Australia, ABCNT Katherine		2485do			
1300	1400	Australia, ABCNT Tennant Crk		2325do			
1300	1400	Australia, Radio	5995pa	6020pa	9475as	9580pa	
		11650pa	11880as	21820as			
1300	1400	Australia, Voice International		13685as			
1300	1400	Canada, CBC Northern Service		9625do			
1300	1400	Canada, CFRX Toronto ON		6070do			
1300	1400	Canada, CFVP Calgary AB		6030do			
1300	1400	Canada, CKZN St John's NF		6160do			
1300	1400	Canada, CKZU Vancouver BC		6160do			
1300	1400	Canada, Radio Canada Intl		9515na	13655na		
1300	1400	as Canada, Radio Canada Intl		17820na			
1300	1400	China, China Radio Intl	7405na	9570pa	11760pa	11980as	15180as
1300	1400	China, Voice of Hope	7485as				
1300	1400	Costa Rica, R for Peace Intl		21815usb			
1300	1400	Costa Rica, University Network		5030am	6150am	7375am	9725sa
		11870am	13750na	17645as			
1300	1400	Ecuador, HCJB	12005am	15115na	21455usb		
1300	1400	a/monthly Finland, Scandv Weekend Radio		5990va	11720va		
1300	1400	Germany, Deutsche Welle		6140eu			
1300	1400	Germany, Overcomer Ministries		5975eu	13810af		
1300	1400	Jordan, Radio	11690eu				
1300	1400	Malaysia, Radio	7295do				
1300	1400	Palau, KHBH/VO Hope	9965as	9985as	12160as	13840as	
1300	1400	mtwhfa Papua New Guinea, NBC		4890do	9675al		
1300	1400	as Russia, University Network		17765as			
1300	1400	S Africa, Channel Africa	11720af	17780af	21725af		
1300	1400	Singapore, R Singapore Intl		6150as	9600as		
1300	1400	South Korea, R Korea Intl		9570as	13670om		
1300	1400	Sri Lanka, SLBC	4940do	6005as	6075as	9770as	15425as
1300	1400	UK, BBC World Service	6190af	6195va	9605as	9740as	
		11760me	11940af	12095eu	12105sa	15190va	15285as
		15565eu	15420af	15485eu	15575eu	17640af	17720eu
		17795af	17830af	17885af	21470af	21640af	17760as
1300	1400	USA, Armed Forces Network		4319usb	4993usb	5765usb	6350usb
		6458usb	10320usb	10940usb	12579usb	12689usb	13362usb
1300	1400	USA, KALJ Dallas TX		13815va			
1300	1400	USA, KNLS Anchor Point AK		11565as			
1300	1400	USA, KTBH Salt Lk City UT		7505na			
1300	1400	USA, KWHR Naalehu HI	9930as	11565pa			
1300	1400	USA, Voice of America	6160va	9645va	9760va	15160va	15425va
1300	1400	USA, WBCQ Kennebunk, ME		17495na			
1300	1400	USA, WEWN Birmingham AL		11550na	11875na	15405eu	15745eu
1300	1400	USA, WHRI Noblesville IN		6040na	15105am		
1300	1400	USA, WINB Red Lion PA	13570am				
1300	1400	USA, WJIE Louisville KY	7490am	13595am			
1300	1400	USA, WRMI Miami FL	15725am				
1300	1400	USA, WRNO New Orleans LA		7395am			
1300	1400	USA, WSHB Cypress Creek SC		6095am	9455am	11660am	
1300	1400	USA, WTJC Newport NC	9370na				
1300	1400	USA, WWCR Nashville TN		9475na	12160na	13845na	
		15825na					
1300	1400	USA, WWRB Manchester TN		9320va	9400va	9495va	12172va
1300	1400	USA, WYFR Okeechobee FL		11550as	11830na	11865sa	
		11970na	17510sa	17750na			
1310	1400	occasional New Zealand, Radio NZ Intl		6095pa			
1330	1350	UAE, Emirates Radio	13630eu	13675eu	15400eu	21597eu	
1330	1357	Vietnam, Voice of	7145eu	9730eu			
1330	1400	Austria, Radio Austria Intl		6155eu	13730eu		
1330	1400	Germany, Voice of Hope	15775as	17550as			
1330	1400	Guam, AWR	11705as	11980as			
1330	1400	India, All India Radio	9690as	11620as	13710as		
1330	1400	Laos, Lao National Radio		7145as			
1330	1400	Sweden, Radio	17505va	18960na			
1330	1400	UAE, AWR	15320as				
1330	1400	Uzbekistan, Radio Tashkent		5975as	7285as	9715as	15295as
		17775as					

1400 UTC - 10AM E / 9AM C / 7AM P

1400	1415	mtwhf UK, BBC World Service	11860af	21490af			
1400	1430	Ecuador, HCJB	12005am	15115na	21455usb		
1400	1430	Thailand, Radio	9830va				
1400	1500	Anguilla, Caribbean Beacon		11775am			
1400	1500	Australia, ABCNT Katherine		2485do			
1400	1500	Australia, ABCNT Tennant Crk		2325do			
1400	1500	Australia, Radio	5995pa	9580pa	11650pa	11660as	
1400	1500	Australia, Voice International		13685as			
1400	1500	Canada, CBC Northern Service		9625do			

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1400	1500	Canada, CFRX Toronto ON	6070do			
1400	1500	Canada, CFVP Calgary AB	6030do			
1400	1500	Canada, CKZN St John's NF	6160do			
1400	1500	Canada, CKZU Vancouver BC	6160do			
1400	1500	Canada, Radio Canada Intl	9515na	13655na	15305na	
		17820na				
1400	1500	China, China Radio Intl 7405na	9700as	11675pa	13685va	15125as
		17720na				
1400	1500	China, Voice of Hope	7485as			
1400	1500	Costa Rica, R for Peace Intl	21815usb			
1400	1500	Costa Rica, University Network	5030am	6150am	7375am	9725sa
		11870am 13750na 17645as				
1400	1500	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va	
1400	1500		France Radio France Intl 11610af	17620af		
1400	1500		Germany, Deutsche Welle	6140eu		
1400	1500		Germany, Overcomer Ministries	5975eu		
1400	1500		India, All India Radio	9690as	11620as	13710as
1400	1500		Japan, Radio	7200as	9505na	11730as 17755me
1400	1500		Jordan, Radio	11690eu		
1400	1500	occasional	New Zealand, Radio NZ Intl	6095pa		
1400	1500		Oman, Radio	13725va		
1400	1500		Palau, KHBN/VO Hope	9965as	12160as	13840as
1400	1500	mtwhfa	Papua New Guinea, NBC	4890do	9675al	
1400	1500		Romania, R Romania Intl	15250eu	17735eu	
1400	1500		Russia, University Network	17765as		
1400	1500		Russia, Voice of Russia	7390as	9745as	12055as 15560as 17645as
1400	1500	as	S Africa, Channel Africa	11720af	21725af	
1400	1500		Singapore, SBC Radio One	6150do		
1400	1500		Sri Lanka, SLBC	4940do	6005as	6075as 9770as 15425as
1400	1500		Taiwan, R Taipei Intl	15265as		
1400	1500		UK, BBC World Service	6190af	6195va	9605as 9740as 12095eu
1400	1500		12105sa 15105af 15190va	15285as	15310as	15365as 15420af
1400	1500		15575eu 15595eu 17640af	17810sa	17830af	21470af
1400	1500		USA, Armed Forces Network	4319usb	4993usb	5765usb 6350usb
1400	1500		6458usb 10320usb 10940usb	12579usb	12689usb	13362usb
1400	1500		USA, KAU Dallas TX	13815va		
1400	1500		USA, KJES Vado NM	11715na		
1400	1500		USA, KTBN Salt Lk City UT	7505na		
1400	1500		USA, KWHR Naalehu HI	9930as	11565pa	
1400	1500		USA, Voice of America	6160va	7125va	9760va 15160va 15255va
			15425va			
1400	1500		USA, WBCQ Kennebunk, ME	17495na		
1400	1500		USA, WEWN Birmingham AL	11550na	11875na	15375na 15745eu
1400	1500		USA, WHRI Noblesville IN	6040na	15105am	
1400	1500		USA, WINB Red Lion PA	13570am		
1400	1500		USA, WJIE Louisville KY	7490am	13595am	
1400	1500		USA, WRMI Miami FL	15725am		
1400	1500		USA, WRNO New Orleans LA	7395am		
1400	1500		USA, WTJC Newport NC	9370na		
1400	1500		USA, WWCN Nashville TN	9475na	12160na	13845na
			15825na			
1400	1500		USA, WWRB Manchester TN	9320va	9400va	12172va
1400	1500		USA, WYFR Okeechobee FL	11550as	11830na	11865sa
			11970na 17510sa 17750na			
1415	1420		Nepal, Radio	3230as	5005as	
1430	1500		Germany, Voice of Hope	17550as		
1430	1500		Guam, TWR 15330as			
1430	1500		Myanmar, Radio	4725do	5985do	
1430	1500		Netherlands, Radio	9890as	11835as	12075as 15220na
1445	1500	f	Seychelles, FEBA Radio	11600as		

1500 UTC - 11AM E / 10AM C / 8AM P

1500	1515	Pakistan, Radio	11570me	15100me	15725af	17750af
1500	1530	Mexico, Radio Mexico Intl	9705am	11770am		
1500	1530	Mongolia, Voice of	12015eu			
1500	1530	S Africa, Channel Africa	17770af			
1500	1556	North Korea, Voice of	9335na	11710na	13760eu	15245eu
1500	1559	Canada, Radio Canada Intl	15455as	17720as		
1500	1559	Canada, Radio Canada Intl	9515na	13655na	17800na	
1500	1600	Anguilla, Caribbean Beacon	11775am			
1500	1600	Australia, Radio	5995pa	9580pa	11650pa	11650pa
		11650pa 11660as				
1500	1600	Australia, Voice International	11930as			
1500	1600	vi	Austria, Radio Africa Intl 17895eu			
1500	1600		Canada, CBC Northern Service	9625do		
1500	1600		Canada, CFRX Toronto ON	6070do		
1500	1600		Canada, CFVP Calgary AB	6030do		
1500	1600		Canada, CKZN St John's NF	6160do		
1500	1600		Canada, CKZU Vancouver BC	6160do		
1500	1600		China, China Radio Intl 7160as	9785as	17720as	
1500	1600		China, Voice of Hope	7485as		
1500	1600		Costa Rica, R for Peace Intl	21815usb		
1500	1600		Costa Rica, University Network	5030am	6150am	7375am 9725sa
			11870am 13750na 17645as			

1500	1600	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va	
1500	1600		Germany, Deutsche Welle	6140eu		
1500	1600		Germany, Overcomer Ministries	13810af		
1500	1600	a	Germany, Overcomer Ministries	6015af		
1500	1600		Germany, Voice of Hope 15715me	15775as		
1500	1600		Guam, TWR 15330as			
1500	1600		Japan, Radio	7200as	9750as	11730as
1500	1600		Jordan, Radio	11690na		
1500	1600		Myanmar, Radio	4725do	5985do	
1500	1600		Netherlands, Radio	9890as	11835as	12075as 15220na
1500	1600	occasional	New Zealand, Radio NZ Intl	6095pa		
1500	1600		Palau, KHBN/VO Hope	9965as	9985as	12160as 13840as
1500	1600	mtwhfa	Papua New Guinea, NBC	4890do	4965me	4975me 7325me 7390as
1500	1600		Russia, Voice of Russia	4940me		
			11500as 11985me			
1500	1600		Singapore, SBC Radio One	6150do		
1500	1600		Sri Lanka, SLBC	4940do	6005as	6075as 9770as 15425as
1500	1600		UK, BBC World Service	5975am	6190af	6195va 9740as 11685as
1500	1600		11860af 12095eu 15190va	15310as	15400af	15420af 15565eu
1500	1600		17700as 17830af 17860af	21470af	21490af	
1500	1600		USA, Armed Forces Network	4319usb	4993usb	5765usb 6350usb
			6458usb 10320usb 10940usb	12579usb	12689usb	13362usb
1500	1600		USA, KAU Dallas TX	13815va		
1500	1600		USA, KJES Vado NM	11715na		
1500	1600		USA, KTBN Salt Lk City UT	15590na		
1500	1600		USA, KWHR Naalehu HI	9930as	11565pa	
1500	1600		USA, Voice of America	6160va	7125va	9590va 9700va 9760va
			9845va 12040va 15205va	15255va	15550va	
1500	1600		USA, WBCQ Kennebunk, ME	17495na		
1500	1600		USA, WEWN Birmingham AL	11550na	11875na	15375na 15745eu
1500	1600		USA, WHRA Greenbush, ME	17650va		
1500	1600		USA, WHRI Noblesville IN	13760na	15105am	
1500	1600		USA, WINB Red Lion PA	13570am		
1500	1600		USA, WJIE Louisville KY	7490am	13595am	
1500	1600		USA, WRMI Miami FL	15725am		
1500	1600		USA, WRNO New Orleans LA	7395am	15420am	
1500	1600		USA, WTJC Newport NC	9370na		
1500	1600		USA, WWCN Nashville TN	9475na	12160na	13845na
			15825na			
1500	1600		USA, WYFR Okeechobee FL	6280as	11830na	15520as
			17750na			
1515	1545	tw	Seychelles, FEBA Radio	11600as		
1515	1600	mif	Seychelles, FEBA Radio	11600as		
1530	1600		Austria, Radio Austria Intl	17860na		
1530	1600		Iran, VOIRI 7245as	9635eu	11775as	
1530	1600	as	Seychelles, FEBA Radio	11600as		
1540	1550		Turkmenistan, Turkmen Radio	4930as		
1550	1600		Vatican City, Vatican Radio	12065au	13765au	15235au

1600 UTC - 12PM E / 11AM C / 9AM P

1600	1610		Vatican City, Vatican Radio	12065au	13765au	15235au
1600	1625		Netherlands, Radio	9890as	11835as	12075as 15220na
1600	1627		Czech Rep, Radio Prague Intl	5930eu	21745va	
1600	1627		Vietnam, Voice of	7145eu	9730eu	
1600	1630		Iran, VOIRI 7245as	9635eu	11775as	
1600	1630		Israel, Kol Israel	15615va	17545va	
1600	1630		Mexico, Radio Mexico Intl	9705am	11770am	
1600	1630		S Africa, Channel Africa	9525af		
1600	1630		USA, KWHR Naalehu HI	9930as		
1600	1635		Germany, Voice of Hope	13810af	17550as	
1600	1640		UAE, Emirates Radio	13630eu	13675eu	15400eu 21597al
1600	1645		Germany, Deutsche Welle	6140eu	6170as	7225as 9735af
			11665af 17595as 21840af			
1600	1650	occasional	New Zealand, Radio NZ Intl	6095pa		
1600	1656		North Korea, Voice of	9975af	11735af	
1600	1700		Algeria, Radio Algiers Intl	11715eu	15160eu	
1600	1700		Anguilla, Caribbean Beacon	11775am		
1600	1700		Australia, Radio	5995pa	9475as	9580pa 11650pa 11660as
1600	1700		Australia, Voice International	11930as		
1600	1700		Canada, CBC Northern Service	9625do		
1600	1700		Canada, CFRX Toronto ON	6070do		
1600	1700		Canada, CFVP Calgary AB	6030do		
1600	1700		Canada, CKZN St John's NF	6160do		
1600	1700		Canada, CKZU Vancouver BC	6160do		
1600	1700		China, China Radio Intl 7190af	13650af		
1600	1700		Costa Rica, R for Peace Intl	21815usb		
1600	1700		Costa Rica, University Network	5030am	6150am	7375am 9725sa
			11870am 13750na			
1600	1700		Ethiopia, Radio	5990do	7110af	7165af 9560af 9704af
			11800af			
1600	1700	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va	
1600	1700		France Radio France Intl 11615af	11995af	12015af	15605af 17605af
			17850af			
1600	1700	a	Germany, Overcomer Ministries	6015af		

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1600	1700	a	Greece, Voice of	9420eu	15630eu	17705na			
1600	1700		Jordan, Radio	11690na					
1600	1700		Palau, KHBV/VO Hope	9965as					
1600	1700		Russia, Voice of Russia	7350as	11720as	11985me	12055as		
			15540me						
1600	1700		South Korea, R Korea Intl		5975som	9515af	9870af		
1600	1700		Taiwan, R Taipei Intl	11550as					
1600	1700	as	UK, BBC World Service	9635af	12095eu				
1600	1700		UK, BBC World Service	3915as	5975as	6190af	6195va	7160af	
			9410eu	9510as	11860af	12095eu	15190va	15310as	
			15400af	15485eu	15565eu	17700eu	17830af	17860af	21470af
			21490af	21660af					
1600	1700		USA, Armed Forces Network		4319usb	4993usb	5765usb	6350usb	
			6458usb	10320usb	10940usb	12579usb	12689usb	13362usb	
1600	1700		USA, KAU Dallas TX	13815va					
1600	1700		USA, KJES Vado NM	11715na					
1600	1700		USA, KTBN Salt Lk City UT		7505na				
1600	1700		USA, Voice of America	6035af	6160va	7125va	9700va	9760va	
			13600va	13710af	15205va	15225af	15410af	15445va	
			17810af	17895va					
1600	1700		USA, WBCQ Kennebunk, ME		17495na				
1600	1700		USA, WEWN Birmingham AL		11550na	13615na	15375na	15745eu	
1600	1700		USA, WHRA Greenbush ME		17650va				
1600	1700		USA, WHRI Noblesville IN		13760na	15105am			
1600	1700		USA, WINB Red Lion PA	13570am					
1600	1700		USA, WJIE Louisville KY	7490am	13595am				
1600	1700		USA, WMLK Bethel PA	9465eu					
1600	1700		USA, WRMI Miami FL	15725am					
1600	1700		USA, WRNO New Orleans LA		7395am	15420am			
1600	1700		USA, WSHB Cypress Creek SC		18910af				
1600	1700		USA, WTJC Newport NC	9370na					
1600	1700		USA, WWCN Nashville TN		9475na	12160na	13845na		
			15825na						
1600	1700		USA, WYFR Okeechobee FL		11830na	13855af	15520as		
			17750na	18980eu	21455eu	21525af			
1610	1625		Armenia, TWR	5855eu					
1615	1630		Vatican City, Vatican Radio		4005eu	5890eu	7250eu	9645eu	
			15595eu						
1630	1700		Georgia, Georgian Radio		6180me				
1630	1700		Guam, AWR	9385me	11850me	17630me			
1630	1700		Slovakia, R Slovakia Intl	5920eu	6055eu	7345eu			
1630	1700		UAE, AWR	9600me					
1630	1700		UK, BBC World Service	11955as	15645eu				
1635	1700		Germany, Voice of Hope	13810af					
1645	1700		Germany, Deutsche Welle		6140eu				
1645	1700		Tajikistan, Radio		7245as				
1650	1700	mtwhf	New Zealand, Radio NZ Intl		6095pa				

1700 UTC - 1PM E / 12PM C / 10AM P

1700	1727		Czech Rep, Radio Prague Intl		5930va	21745va			
1700	1730		Azerbaijan, Voice of	6110eu					
1700	1730		France Radio France Intl	15605af	17605af				
1700	1730	mtwhf	S Africa, Channel Africa	17860af					
1700	1750		New Zealand, Radio NZ Intl		6095pa				
1700	1759		Poland, Radio Polonia	5995eu					
1700	1800		Anguilla, Caribbean Beacon		11775am				
1700	1800		Australia, Radio		9475as	9580pa	9815pa		
			11880pa						
1700	1800		Canada, CBC Northern Service		9625do				
1700	1800		Canada, CFRX Toronto ON		6070do				
1700	1800		Canada, CFVP Calgary AB		6030do				
1700	1800		Canada, CKZN St John's NF		6160do				
1700	1800		Canada, CKZU Vancouver BC		6160do				
1700	1800		China, China Radio Intl	7150af	9570af	9675as	11910af	15205af	
1700	1800		Costa Rica, R for Peace Intl		21815usb				
1700	1800		Costa Rica, University Network		5030am	6150am	7375am	9725sa	
			11870am	13750na	17645as				
1700	1800	mtwhf	Eqt Guinea, Radio Africa		15185af				
1700	1800	a/monthly	Finland, Scandv Weekend Radio		6170va	11720va			
1700	1800	a/monthly	Finland, Scandv Weekend Radio		6170va	11720va			
1700	1800	a	Germany, Overcomer Ministries		6015af				
1700	1800		Germany, Unt. Methodist Church		11735af	13820af			
1700	1800		Germany, Voice of Hope	9495eu					
1700	1800		Japan, Radio		9505na	11970eu	15355af		
1700	1800		Romania, R Romania Intl		11740eu	15380eu	15365eu	17805eu	
1700	1800		Russia, Voice of Russia	9745af	9775eu	9890eu	11510af	11985af	
1700	1800	as	Russia, Voice of Russia	7360eu	9480eu	11675eu			
1700	1800		Taiwan, R Taipei Intl	11550as					
1700	1800		UK, BBC World Service	3255af	3915af	5975as	6190af	6195eu	
			7160af	7230af	9410eu	9510as	9630af	11860af	12095eu
			15310as	15400af	15420af	17830af	17860af	21470af	
1700	1800		USA, Armed Forces Network		4319usb	4993usb	5765usb	6350usb	
			6458usb	10320usb	10940usb	12579usb	12689usb	13362usb	
1700	1800		USA, KAU Dallas TX	13815va					

1700	1800		USA, KTBN Salt Lk City UT		7505na				
1700	1800		USA, Voice of America	6160va	7125va	7170va	9700va	9645va	
			15205va	15255va	15410af	15445af	17895af		
1700	1800	mtwhf	USA, Voice of America	5990va	6045va	7215va	9770va	9785va	
1700	1800		USA, WBCQ Kennebunk, ME		17495na				
1700	1800		USA, WEWN Birmingham AL		11550na	13615na	15745eu	17595eu	
1700	1800		USA, WHRA Greenbush ME		17650va				
1700	1800		USA, WHRI Noblesville IN		9495am	13760va			
1700	1800		USA, WINB Red Lion PA	13570am					
1700	1800		USA, WJIE Louisville KY	7490am	13595am				
1700	1800		USA, WMLK Bethel PA	15265eu					
1700	1800		USA, WRMI Miami FL	15725am					
1700	1800		USA, WRNO New Orleans LA		7395am	15420am			
1700	1800		USA, WSHB Cypress Creek SC		18910af				
1700	1800		USA, WTJC Newport NC	9370na					
1700	1800		USA, WWCN Nashville TN		9475na	12160na	13845na		
			15815na						
1700	1800		USA, WWRB Manchester TN		9495va	12172va			
1700	1800		USA, WYFR Okeechobee FL		13855af	18980eu	21455eu		
1730	1745	vl	Libya, Voice of Africa	15435irr	17750irr				
1730	1745		UK, BBC World Service	9525af					
1730	1745	mtwhf/vl	UK, United Nations Radio		6125af	15495me	17580af		
1730	1755		Belgium, RVI Flanders R Intl		9925eu	13690eu	13710eu		
1730	1800	ireg	Liberia, ELWA	4760do					
1730	1800	vl/mtwhfa	Malta, VO Mediterranean		9605eu				
1730	1800		Netherlands, Radio	6020af	7120af	11655af			
1730	1800		Swaziland, TWR	9500af					
1730	1800	mtwhfa	Sweden, Radio	6065va	13580va				
1730	1800		Switzerland, Swiss R Intl	15220va	17735va	21720va			
1730	1800		Vatican City, Vatican Radio		13765af	15570af	17515af		
1735	1745	vl/th	Paraguay, Radio Nacional		9739sa				
1745	1800		Bangladesh, Bangla Betar		7185eu	9550eu	15520eu		
1745	1800		India, All India Radio	7410eu	11620eu	11935af	13605af	15075af	
			15155af	17670af					
1750	1800	mtwhf	New Zealand, Radio NZ Intl		11725pa				

1800 UTC - 2PM E / 1PM C / 11AM P

1800	1827		Vietnam, Voice of	5970eu	7145eu	9725eu	9730eu		
1800	1830	s	Germany, Universal Life/Santec		15750af				
1800	1830	s	Greece, Voice of	9420eu	15630eu	17705na			
1800	1830		Netherlands, Radio	6020af	7120af	11655af			
1800	1830		SAfrica, AVR	5970af	6095af	7170af			
1800	1830		SAfrica, Channel Africa	17860af					
1800	1830		UK, RTE Radio	15315me					
1800	1830	vl	Zimbabwe, ZBC Corp	4828do					
1800	1850	mtwhf	New Zealand, Radio NZ Intl		11725pa				
1800	1900		Anguilla, Caribbean Beacon		11775am				
1800	1900		Australia, Radio	6080pa	7240pa	9475as	9580pa	9815pa	
			11880pa						
1800	1900		Bangladesh, Bangla Betar		7185eu	9550eu	15520eu		
1800	1900		Canada, CBC Northern Service		9625do				
1800	1900		Canada, CFRX Toronto ON		6070do				
1800	1900		Canada, CFVP Calgary AB		6030do				
1800	1900		Canada, CKZN St John's NF		6160do				
1800	1900		Canada, CKZU Vancouver BC		6160do				
1800	1900		Costa Rica, R for Peace Intl		21815usb				
1800	1900		Costa Rica, University Network		5030am	6150am	7375am	9725sa	
			11870am 13750na 17645as						
1800	1900	mtwhf	Eqt Guinea, Radio Africa		15185af				
1800	1900	a/monthly	Finland, Scandv Weekend Radio		6170va	11720va			
1800	1900		Germany, Unt. Methodist Church		11735af	13820af			
1800	1900		Germany, Voice of Hope	9495eu	15715me				
1800	1900		India, All India Radio	7410eu	11620eu	11935af	13605af	15075af	
			15155af 17670af						
1800	1900		Kuwait, Radio	11990va					
1800	1900	irreg	Liberia, ELWA	4760do					
1800	1900		Liberia, R Liberia Intl	5100do					
1800	1900		Russia, Voice of Russia	5950eu	7300eu	9480eu	9745af	9775eu	
			9890eu 11510af	11630eu	11675eu	11870af			
1800	1900		Swaziland, TWR	9500af					
1800	1900		Taiwan, R Taipei Intl	3955eu					
1800	1900		UK, BBC World Service	3255af	5975as	6050eu	6190af	6195eu	
			9410eu 9510as	12095eu	15310me	15400af	15420af	17830af	
			17885af 21470af						
1800	1900		USA, Armed Forces Network		4319usb	4993usb	5765usb	6350usb	
			6458usb 10320usb	10940usb	12579usb	12689usb	13362usb		
1800	1900		USA, KAU Dallas TX	13815va					
1800	1900		USA, KTBN Salt Lk City UT		7505na				
1800	1900		USA, Voice of America	6035af	7415af	9760va	9770va	11975af	
			15410af 15580af	17895af					
1800	1900		USA, WBCQ Kennebunk, ME		17495na				
1800	1900		USA, WEWN Birmingham AL		11530na	13615na	15745eu	17595eu	
1800	1900		USA, WHRA Greenbush ME		17650va				
1800	1900		USA, WHRI Noblesville IN		9495am	13760va			

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1800	1900	USA, WINB Red Lion PA	13570am				
1800	1900	USA, WJIE Louisville KY	7490am	13595am			
1800	1900	USA, WMLK Bethel PA	15265eu				
1800	1900	USA, WRMI Miami FL	15725am				
1800	1900	USA, WRNO New Orleans LA	7395am	15420am			
1800	1900	USA, WSHB Cypress Creek SC	15665eu	18910af			
1800	1900	USA, WTJC Newport NC	9370na				
1800	1900	USA, WWCN Nashville TN	9475na	12160na	13845na		
		15815na					
1800	1900	USA, WYFR Okeechobee FL	18980eu				
1800	1900	Yemen, Rep of Yemen Radio	9780me				
1830	1900	Austria, Radio Austria Intl	5945eu	6155eu			
1830	1900	Georgia, Georgian Radio	6230eu				
1830	1900	Georgia, Georgian Radio	11910as				
1830	1900	Greece, Voice of	11645eu				
1830	1900	Greece, Voice of	9420eu	15630eu	17705na		
1830	1900	Netherlands, Radio	6020af	7120af	9895af	11655af	13700af
1830	1900	S Africa, AWR	7170af				
1830	1900	Slovakia, R Slovakia Intl	5920eu	6055eu	7345eu		
1830	1900	Turkey, Voice of	11960eu				
1830	1900	UK, RTE Radio	13640na	21630af			
1830	1900	USA, Voice of America	11690af	15525af			
1845	1900	Albania, Radio Tirana Intl	7210na	9520na			
1851	1900	New Zealand, Radio NZ Intl	11725pa				

1900 UTC - 3PM E / 2PM C / 12PM P

1900	1925	Israel, Kol Israel	9435va	11605va	15615va	15640af	17545va
1900	1927	Vietnam, Voice of	7145eu	9730eu			
1900	1930	Hungary, Radio Budapest	6025eu	7130eu			
1900	1930	Turkey, Voice of	11960eu				
1900	1945	Germany, Deutsche Welle	17810af	11805af	11965af	13720af	15390af
		17810af					
1900	1945	India, All India Radio	7410eu	11620eu	11935af	13605af	15075af
		15155af	17670af				
1900	1945	Iraq, Radio Iraq Intl	7157irr	9887irr	11787irr		
1900	1945	Zimbabwe, ZBC Corp	4828do	5012do			
1900	1950	New Zealand, Radio NZ Intl	11725pa				
1900	1956	North Korea, Voice of	13760eu	15245eu			
1900	2000	Anguilla, Caribbean Beacon	11775am				
1900	2000	Argentina, RAE	9690eu	15345eu			
1900	2000	Australia, Radio	6080pa	7240pa	9500as	9580pa	9815pa
		11880pa					
1900	2000	Botswana, Radio	3356do	4820do	7255do		
1900	2000	Bulgaria, Radio	9400eu	11900eu			
1900	2000	Cameroon, RTV	4850do				
1900	2000	Canada, CBC Northern Service	9625do				
1900	2000	Canada, CFRX Toronto ON	6070do				
1900	2000	Canada, CFVP Calgary AB	6030do				
1900	2000	Canada, CKZN St John's NF	6160do				
1900	2000	Canada, CKZU Vancouver BC	6160do				
1900	2000	China, China Radio Intl	9440af	9585af			
1900	2000	Costa Rica, R for Peace Intl	2181usb				
1900	2000	Costa Rica, University Network	5030am	6150am	7375am	9725sa	
		11870am	13750na	17645as			
1900	2000	Eat Guinea, Radio Africa	15185af				
1900	2000	Finland, Scandv Weekend Radio	6170va	11720va			
1900	2000	Germany, Voice of Hope	15715me				
1900	2000	Ghana, Ghana BC Corp	3366do	4915do			
1900	2000	Guyana, Voice of	3290do				
1900	2000	Kenya, Kenya BC Corp	4885do	4935do			
1900	2000	Kuwait, Radio	11990va				
1900	2000	Liberia, ELWA	4760do				
1900	2000	Liberia, R Liberia Intl	5100do				
1900	2000	Malaysia, Radio	7295do				
1900	2000	Malta, VO Mediterranean	12060eu				
1900	2000	Namibia, NBC	3270af	3290af			
1900	2000	Netherlands, Radio	6020af	7120af	9895af	11655af	13700af
1900	2000	Nigeria, Radio/Enugu	6025do				
1900	2000	Nigeria, Radio/Ibadan	6050do				
1900	2000	Nigeria, Radio/Kaduna	4770do	6090do	9570do		
1900	2000	Nigeria, Radio/Lagos	3326do	4990al			
1900	2000	Nigeria, Voice of	7255af				
1900	2000	Papua New Guinea, NBC	4890do	9675al			
1900	2000	Russia, Voice of Russia	7440eu	9480eu	9775eu	9890eu	11675eu
		12030eu	12070eu	15735am			
1900	2000	Sierra Leone, SLBS	3316do				
1900	2000	South Korea, R Korea Intl	5975om	7275eu			
1900	2000	Thailand, Radio	7155eu				
1900	2000	Uganda, Radio	4976do	5026al	7195al		
1900	2000	UK, BBC World Service	3255af	5975as	6005af	6190af	6195eu
		9410eu	9630af	11720as	12095eu	15105af	15310as
		17830af	17885af				
1900	2000	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
		6458usb	10320usb	10940usb	12579usb	12689usb	13362usb

1900	2000	USA, KAUJ Dallas TX	13815va				
1900	2000	USA, KJES Vado NM	15385au				
1900	2000	USA, KLTN Salt Lk City UT	7505na				
1900	2000	USA, Voice of America	4950af	6035af	6095va	6160va	7260va
		7375af	7415af	9525va	9680va	9770va	11770va
		13635va	15180va	15410af	15445af	15580af	
1900	2000	USA, WBCQ Kennebunk, ME	17495na				
1900	2000	USA, WEWN Birmingham AL	11550na		13615na	15745eu	17595eu
1900	2000	USA, WHRA Greenbush ME	17650va				
1900	2000	USA, WHRI Noblesville IN	9495am	13760va			
1900	2000	USA, WINB Red Lion PA	13570am				
1900	2000	USA, WJIE Louisville KY	7490am	13595am			
1900	2000	USA, WMLK Bethel PA	15265eu				
1900	2000	USA, WRMI Miami FL	15725am				
1900	2000	USA, WRNO New Orleans LA	7395am	15420am			
1900	2000	USA, WSHB Cypress Creek SC	15665eu	18910af			
1900	2000	USA, WTJC Newport NC	9370na				
1900	2000	USA, WWCN Nashville TN	9475na	12160na	13845na		
		15815na					
1900	2000	USA, WYFR Okeechobee FL	15775af	18930eu	18980eu		
1900	2000	Vanuatu, Radio	4960do	7260do			
1900	2000	Zambia, Christian Voice	4965af				
1900	2000	Zambia, Radio ZNBC	4910do	6265al			
1930	1955	Belgium, RVI Flanders R Intl	9925eu	13690eu			
1930	2000	Austria, AWR	7130eu				
1930	2000	Belarus, Radio Belarus Intl	7105eu	7210eu			
1930	2000	Georgia, Georgian Radio	11760eu				
1930	2000	Iran, VOIRI	9800eu	11670eu	11750af	11855eu	
1930	2000	Poland, Radio Polonia	7165eu	7265eu			
1930	2000	Solomon Islands, SIBC	5020do				
1930	2000	Sweden, Radio	6065va				
1930	2000	Switzerland, Swiss R Intl	13645af	15220af	17580af	17735af	
1930	2000	USA, Voice of America	9550va	9840va	11780va	11970va	12015va
		13715va	15235va				
1935	1955	Italy, RAI Intl	5970eu	9745eu			
1950	2000	Vatican City, Vatican Radio	4005eu	5885eu	7250eu	9645eu	
1951	2000	New Zealand, Radio NZ Intl	15160pa				

2000 UTC - 4PM E / 3PM C / 1PM P

2000	2010	Vatican City, Vatican Radio	4005eu	5885eu	7250eu	9645af	
		9660af	11625af	13765af			
2000	2015	Solomon Islands, SIBC	5020do				
2000	2025	Netherlands, Radio	6020af	7120af	9895af	11655af	13700af
2000	2027	Czech Rep, Radio Prague Intl	5930va	11600va			
2000	2027	Iran, VOIRI	9800eu	11670eu	11750af	11855eu	
2000	2029	Poland, Radio Polonia	7165eu	7265eu			
2000	2030	Lithuania, Tomorrow's Nk Today	7590eu				
2000	2030	Mongolia, Voice of	12015eu				
2000	2030	Solomon Islands, SIBC	5020do				
2000	2030	Switzerland, Swiss R Intl	13645af	15220af	17580af	17735af	
2000	2030	USA, Voice of America	4950af	6035af	7375af	7415af	11855af
		11975af	15410af	15445af	15580af	17745af	17895af
2000	2045	Germany, Deutsche Welle	6140eu				
2000	2045	Iraq, Radio Iraq Intl	7157irr	9887irr	11787irr		
2000	2059	Canada, Radio Canada Intl	5850va	5995va	11690va	11965va	
		12015va	15325va	15470va			
2000	2100	Algeria, Radio Algiers Intl	11715eu	15160eu			
2000	2100	Anguilla, Caribbean Beacon	11775am				
2000	2100	Australia, ABC NT Katherine	2485do				
2000	2100	Australia, ABC NT Tennant Crk	2325do				
2000	2100	Australia, Radio	9500as	9580pa	9815pa	11880pa	
		12080pa					
2000	2100	Botswana, Radio	3356do	4820do	7255do		
2000	2100	Cameroon, RTV	4850do				
2000	2100	Canada, CBC Northern Service	9625do				
2000	2100	Canada, CFRX Toronto ON	6070do				
2000	2100	Canada, CFVP Calgary AB	6030do				
2000	2100	Canada, CKZN St John's NF	6160do				
2000	2100	Canada, CKZU Vancouver BC	6160do				
2000	2100	China, China Radio Intl	5965eu	9840eu	11640eu	13640af	
2000	2100	Costa Rica, R for Peace Intl	2181usb				
2000	2100	Costa Rica, University Network	5030am	6150am	7375am	9725sa	
		11870am	13750na	17645as			
2000	2100	Ecuador, HCJB	17660eu				
2000	2100	Eat Guinea, Radio Africa	15185af				
2000	2100	Finland, Scandv Weekend Radio	5990va	11720va			
2000	2100	Germany, Voice of Hope	6175eu	15715me			
2000	2100	Ghana, Ghana BC Corp	3366do	4915do			
2000	2100	Indonesia, Voice of	9525pa	11785af	15150as		
2000	2100	Kenya, Kenya BC Corp	4885do	4935do			
2000	2100	Kuwait, Radio	11990va				
2000	2100	Liberia, ELWA	4760do				
2000	2100	Liberia, R Liberia Intl	5100do				
2000	2100	Malaysia, Radio	7295do				

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2000	2100	Namibia, NBC	3270af	3290af					
2000	2100	New Zealand, Radio NZ Intl		15160pa					
2000	2100	Nigeria, Radio/Enugu	6025do						
2000	2100	Nigeria, Radio/Ibadan	6050do						
2000	2100	Nigeria, Radio/Kaduna	4770do	6090do	9570do				
2000	2100	Nigeria, Radio/Lagos	3326do	4990al					
2000	2100	Nigeria, Voice of	7255af						
2000	2100	Russia, Voice of Russia	9480eu	9775eu	11675eu	12030eu	12070eu		
		15455eu	15735am						
2000	2100	S Africa, AWR	9745af						
2000	2100	Sierra Leone, SLBS	3316do						
2000	2100	Spain, R Exterior Espana	9570af	15290af					
2000	2100	Uganda, Radio	4976do	5026al	7195al				
2000	2100	UK, BBC World Service	3255af	5975ca	6005af	6190af	6195eu		
		9410eu	9630af	11835af	11955eu	12095eu	15400af	17830af	
2000	2100	USA, Armed Forces Network		4319usb	4993usb	5765usb	6350usb		
		6458usb	10320usb	10940usb	12579usb	12689usb	13362usb		
2000	2100	USA, KAU Dallas TX	13815va						
2000	2100	USA, KJES Vado NM	15385na						
2000	2100	USA, KTVN Salt Lk City UT		7505na					
2000	2100	USA, Voice of America	6095va	6160va	9770va				
2000	2100	USA, WBCQ Kennebunk, ME		7415na	17495na				
2000	2100	USA, WVEW Birmingham AL		11530na	11550na	13615na	15745eu		
		17595eu							
2000	2100	USA, WHRA Greenbush ME		17650va					
2000	2100	USA, WHRI Noblesville IN		5745va	9495am	13760va			
2000	2100	USA, WINB Red Lion PA	13570am						
2000	2100	USA, WJIE Louisville KY	7490am	13595am					
2000	2100	USA, WMLK Bethel PA	15265eu						
2000	2100	USA, WRMI Miami FL	15725am						
2000	2100	USA, WRNO New Orleans LA		7395am	15420am				
2000	2100	USA, WTJC Newport NC	9370na						
2000	2100	USA, WWCR Nashville TN		9475na	12160na	13845na			
		15815na							
2000	2100	USA, WWRB Manchester TN		9320va	9400va	12172va			
2000	2100	USA, WYFR Okeechobee FL		13855af	15775af	17725sa	17845af		
		18980eu							
2000	2100	Vanuatu, Radio	4960do	7260do					
2000	2100	Zambia, Christian Voice	4965af						
2000	2100	Zambia, Radio ZNBC	4910do	6265al					
2000	2100	Zimbabwe, ZBC Corp	5975do	6045al					
2000	2100	USA, WSHB Cypress Creek SC		15665eu	18910af				
2005	2100	Syria, Radio Damascus	12085eu	13610eu					
2010	2030	Vatican City, Vatican Radio		9660af	11625af	13765af			
2025	2045	Italy, RAI Intl	6185af	9760af	11880af				
2030	2045	Libya, Voice of Africa	15435irr	17750irr					
2030	2045	Thailand, Radio	9680eu						
2030	2057	Vietnam, Voice of	7145eu	9730eu					
2030	2100	Belarus, Radio Belarus Intl		7105eu	7210eu				
2030	2100	Cuba, Radio Havana	13660usb	13750eu					
2030	2100	Ecuador, HCJB	21455usb						
2030	2100	Solomon Islands, SIBC	5020do						
2030	2100	Turkey, Voice of	9525as						
2030	2100	UK, Wales Radio Intl	7325eu						
2030	2100	USA, Voice of America	6035af	7375af	7415af	11975af	15410af		
		15455af	15580af	17745af	17895af				
2030	2100	USA, Voice of America	4950af						
2030	2100	Uzbekistan, Radio Tashkent		5025eu	9545eu	11905eu			
2040	2100	Armenia, Voice of	4810eu	9960eu					
2045	2100	India, All India Radio	7150eu	9650eu	11620eu	11715eu			

2100 UTC - 5PM E / 4PM C / 2PM P

2100	2130	Australia, ABCNT Katherine	2485do						
2100	2130	Australia, ABCNT Tennant Crk	2325do						
2100	2130	Australia, Radio	7240pa	9500as	9580pa	9660pa			
		11880pa	12080pa	17715pa	21740pa				
2100	2130	Canada, Radio Canada Intl		5850va	7235va	13690va	15325va		
		17870va							
2100	2130	Cuba, Radio Havana	13660usb	13750eu					
2100	2130	Hungary, Radio Budapest		3975eu	6025eu				
2100	2130	Kenya, Kenya BC Corp	4885do	4935do					
2100	2130	Nigeria, Radio/Ibadan	6050do						
2100	2130	South Korea, R Korea Intl		3955eu	15575eu				
2100	2130	Turkey, Voice of	9525as						
2100	2145	Germany, Deutsche Welle		9670as	9765as	9830af	11865af		
		11915as	15135af						
2100	2156	North Korea, Voice of	13760eu	15245eu					
2100	2200	Anguilla, Caribbean Beacon		11775am					
2100	2200	Austria, AWR	15355af						
2100	2200	Botswana, Radio	3356do	4820do					
2100	2200	Bulgaria, Radio	9400eu	11900eu					
2100	2200	Cameroon, RTV	4850do						
2100	2200	Canada, CBC Northern Service		9625do					
2100	2200	Canada, CFRX Toronto ON		6070do					

2100	2200	Canada, CFVP Calgary AB	6030do						
2100	2200	Canada, CKZN St John's NF	6160do						
2100	2200	Canada, CKZU Vancouver BC	6160do						
2100	2200	China, China Radio Intl	5965eu	9840eu	9840eu	11735eu			
		13630af							
2100	2200	Costa Rica, R for Peace Intl	21815usb						
2100	2200	Costa Rica, University Network	5030am	6150am	7375am	9725sa			
		11870am	13750na	17645as					
2100	2200	Ecuador, HCJB	17660eu	21455usb					
2100	2200	Eqt Guinea, Radio Africa		15185af					
2100	2200	Finland, Scandv Weekend Radio		6170va	11690va				
2100	2200	Ghana, Ghana BC Corp		3366do	4915do				
2100	2200	Guyana, Voice of	3290do	5950do					
2100	2200	India, All India Radio	7150eu	9650eu	11620eu	11715eu			
2100	2200	Japan, Radio	6035pa	6055eu	6180eu	11830eu			
		11855af	17825na	17860pa					
2100	2200	Liberia, ELWA	4760do						
2100	2200	Liberia, R Liberia Intl	5100do						
2100	2200	Malaysia, Radio	7295do						
2100	2200	Namibia, NBC	3270af	3290af					
2100	2200	New Zealand, Radio NZ Intl		15160pa					
2100	2200	New Zealand, Radio NZ Intl		15160pa					
2100	2200	Nigeria, Radio/Enugu	6025do						
2100	2200	Nigeria, Radio/Kaduna	4770do	6090do	9570do				
2100	2200	Nigeria, Radio/Lagos	3326do	4990al					
2100	2200	Palau, KHBN/VO Hope	9985as						
2100	2200	Papua New Guinea, NBC		4890do	9675al	11740eu			
2100	2200	Romania, R Romania Intl		11940eu	9510eu	9725eu			
		11940eu							
2100	2200	Sierra Leone, SLBS	3316do						
2100	2200	Solomon Islands, SIBC	5020do						
2100	2200	Spain, R Exterior Espana	9570af	9840eu					
2100	2200	Syria, Radio Damascus	12085eu	13610eu					
2100	2200	Taiwan, R Taipei Intl	15600eu						
2100	2200	UK, BBC World Service	3255af	3915as	6005af	6190af	6195eu		
		9410eu	11675va	11835af	11945as	12095sa	15400af		
2100	2200	Ukraine, R Ukraine Intl	5905eu	6020eu	9950eu	11705eu			
		11950eu							
2100	2200	USA, Armed Forces Network		4319usb	4993usb	5765usb			
		6350usb	6458usb	10320usb	10940usb	12579usb	12689usb		
		13362usb							
2100	2200	USA, KAU Dallas TX	13815va						
2100	2200	USA, KTVN Salt Lk City UT		7505na					
2100	2200	USA, Voice of America	6035af	6040va	6095va	7375af	7415af		
		9530va	9705va	9760va	11870va	11975af	13765va		
		15185va	15410af	15455af	15580af	17740va	17820va		
		17895af							
2100	2200	USA, WBCQ Kennebunk, ME		7415na	9355na				
2100	2200	USA, WVEW Birmingham AL		11530na	11550na	13615na			
		17595eu							
2100	2200	USA, WHRA Greenbush ME		17650va					
2100	2200	USA, WHRI Noblesville IN		5745va	9495am	13760va			
2100	2200	USA, WINB Red Lion PA	13570am						
2100	2200	USA, WJIE Louisville KY	7490am	13595am					
2100	2200	USA, WMLK Bethel PA	15265eu						
2100	2200	USA, WRMI Miami FL	15725am						
2100	2200	USA, WRNO New Orleans LA		7395am	15420am				
2100	2200	USA, WSHB Cypress Creek SC		15665eu	18910af				
2100	2200	USA, WTJC Newport NC	9370na						
2100	2200	USA, WWCR Nashville TN		9475na	12160na	13845na			
		15815na							
2100	2200	USA, WWRB Manchester TN		9320va	9400va	12172va			
2100	2200	USA, WYFR Okeechobee FL		13855na	15120af	17725af			
		17845af	18980eu						
2100	2200	Vanuatu, Radio	4960do	7260do					
2100	2200	Zambia, Christian Voice	4965af						
2100	2200	Zambia, Radio ZNBC	4910do	6265al					
2100	2200	Zimbabwe, ZBC Corp	5975do	6045al					
2130	2157	Czech Rep, Radio Prague Intl		11600va	15545va				
2130	2200	Albania, Radio Tirana Intl		7130eu	9540eu				
2130	2200	Australia, ABC NT Alice Springs		4835do					
2130	2200	Australia, ABC NT Katherine		5025do					
2130	2200	Australia, ABC NT Tennant Crk		4910do					
2130	2200	Australia, Radio	7240pa	9660pa	11880pa	12080pa			
		17715pa	21740pa						
2130	2200	Austria, Radio Austria Intl		5945va	6155eu				
2130	2200	Guam, AWR		11850as	11980as				
2130	2200	Iran, VOIRI	9570as	13655au					
2130	2200	South Korea, R Korea Intl		15575eu					
2130	2200	Sweden, Radio	6065va	15255va					
2130	2200	Uzbekistan, Radio Tashkent		5025eu	9545eu	11905eu			

Shortwave Guide

MT

2200 UTC - 6PM E / 5PM C / 3PM P

2200	2205	vi	Syria, Radio Damascus	12085eu	13610eu			
2200	2215		New Zealand, Radio NZ Intl		15160pa			
2200	2230		Azerbaijan, Voice of	6110as				
2200	2230		Canada, Radio Canada Intl	6175am	9590am	11920am		
			13670am 15305am	17695am	17880am			
2200	2230		India, All India Radio	7150eu	9650eu	11620au	11715au	
2200	2230		Iran, VOIRI 9570au	13655au				
2200	2230	as	USA, Voice of America	5855af	6035af	7375af	7415af	
			11975af					
2200	2230	vi	Zambia, Radio ZNBC	4910do	6265al			
2200	2230	vi	Zimbabwe, ZBC Corp	5975do	6045al			
2200	2300		Anguilla, Caribbean Beacon		6090am			
2200	2300		Australia, ABC NT Alice Springs		4835do			
2200	2300		Australia, ABC NT Katherine		5025do			
2200	2300		Australia, ABC NT Tennant Crk		4910do			
2200	2300		Australia, Radio	13620as	15240as	17715pa	17795va	
			21470pa					
2200	2300	irr/vl	Cameroon, RTV	4850do				
2200	2300		Canada, CBC Northern Service		9625do			
2200	2300		Canada, CFRX Toronto ON		6070do			
2200	2300		Canada, CFVP Calgary AB		6030do			
2200	2300		Canada, CKZN St John's NF		6160do			
2200	2300		Canada, CKZU Vancouver BC		6160do			
2200	2300		China, China Radio Intl 7170eu					
2200	2300		Costa Rica, R for Peace Intl	15050va	21815usb			
2200	2300		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na	17645as				
2200	2300	mtwhf	Eat Guinea, Radio Africa		15185af			
2200	2300	f/monthly	Finland, Scandv Weekend Radio		6170va	11690va		
2200	2300	vi	Ghana, Ghana BC Corp		3366do	4915do		
2200	2300		Guyana, Voice of	3290do	5950do			
2200	2300		Liberia, R Liberia Intl	5100do				
2200	2300		Malaysia, Radio	7295do				
2200	2300		Namibia, NBC	3270af	3290af			
2200	2300		Nigeria, Radio/Enugu	6025do				
2200	2300		Nigeria, Radio/Kaduna	4770do	6090do	9570do		
2200	2300		Nigeria, Radio/Lagos	3326do	4990al			
2200	2300		Palau, KHBN/VO Hope	9965as	9985as			
2200	2300	vi	Sierra Leone, SLBS	3316do				
2200	2300		Solomon Islands, SIBC	5020do				
2200	2300		Taiwan, R Taipei Intl	15600eu				
2200	2300		Turkey, Voice of	11960va	12000va			
2200	2300		UK, BBC World Service	3915as	5965as	5975am	6195as	7105as
			9580eu 9740as	11685as	1195as	12095af		
			15390ca 15400af					
2200	2300		USA, Armed Forces Network	4319usb	4993usb	5765usb		
			6350usb 6458usb	10320usb	10940usb	12579usb	12689usb	
			13362usb					
2200	2300		USA, KAUJ Dallas TX	13815va				
2200	2300		USA, KTBN Salt Lk City UT		7505na			
2200	2300		USA, KWHR Naalehu HI	17510as				
2200	2300		USA, Voice of America	7215va	9705va	9770va	11760va	
			13765va 15185va	15290va	15305va	17740va	17820va	
2200	2300		USA, WBCQ Kennebunk, ME	7415na	9355na			
2200	2300		USA, WEWN Birmingham AL	9975eu	11530na	11550na		
			15745eu 17595eu					
2200	2300		USA, WHRA Greenbush ME	7580eu	17650af			
2200	2300		USA, WHRI Noblesville IN	5745va	9495am	13760va		
2200	2300		USA, WINB Red Lion PA	13570am				
2200	2300		USA, WJIE Louisville KY	7490am	13595am			
2200	2300		USA, WRMI Miami FL	15725am				
2200	2300		USA, WRNO New Orleans LA	7395am	15420am			
2200	2300		USA, WSHB Cypress Creek SC	13770eu	15285sa			
2200	2300		USA, WTJC Newport NC	9370na				
2200	2300		USA, WWCR Nashville TN	7465na	9475na	12160na		
			13845na					
2200	2300		USA, WWRB Manchester TN	6890va	9320va	9400va		
			12172va					
2200	2300		USA, WYFR Okeechobee FL	11740na	15695af	15695af		
			17845af					
2200	2300	vi	Vanuatu, Radio	4960do	7260do			
2200	2300		Zambia, Christian Voice	4965af				
2205	2230		Italy, RAI Intl	11900as	15625as			
2216	2300		New Zealand, Radio NZ Intl		17675pa			
2230	2255		Belgium, RVI Flanders R Intl		15565na			
2230	2257		Czech Rep, Radio Prague Intl	11600na	15545na			
2230	2300		Canada, Radio Canada Intl	6175na	9590na	13670na		
			17695na					
2230	2300		Cuba, Radio Havana	9550am				
2245	2300		India, All India Radio	9705as	9950as	11620as	13605as	

2300 UTC - 7PM E / 6PM C / 4PM P

2300	0000		Anguilla, Caribbean Beacon		6090am			
2300	0000		Australia, ABC NT Alice Springs		4835do			
2300	0000		Australia, ABC NT Katherine		5025do			
2300	0000		Australia, ABC NT Tennant Crk		4910do			
2300	0000		Australia, Radio	9660pa	12080pa	13620as	15240as	
			17715pa 17795pa	21740pa				
2300	0000		Bulgaria, Radio	9400na	11700na			
2300	0000	irr/vl	Cameroon, RTV	4850do				
2300	0000		Canada, CBC Northern Service		9625do			
2300	0000		Canada, CFRX Toronto ON		6070do			
2300	0000		Canada, CFVP Calgary AB		6030do			
2300	0000		Canada, CKZN St John's NF		6160do			
2300	0000		Canada, CKZU Vancouver BC		6160do			
2300	0000		China, China Radio Intl 5990na		13680na			
2300	0000		Costa Rica, R for Peace Intl		15050va	21815usb		
2300	0000		Costa Rica, University Network		5030am	6150am	7375am	9725sa
			11870am 13750na	17645as				
2300	0000		Egypt, Radio Cairo	9900na				
2300	0000	f/monthly	Finland, Scandv Weekend Radio		5980va	11690va		
2300	0000	vi	Ghana, Ghana BC Corp		3366do	4915do		
2300	0000		Guyana, Voice of	3290do	5950do			
2300	0000		India, All India Radio	9705as	9950as	11620as	13605as	
2300	0000		Liberia, R Liberia Intl	5100do				
2300	0000		Malaysia, Radio	7295do				
2300	0000		Namibia, NBC	3270af	3290af			
2300	0000		New Zealand, Radio NZ Intl		17675pa			
2300	0000		Palau, KHBN/VO Hope	9965as	9985as			
2300	0000		Romania, R Romania Intl		9570eu	11740na	11775na	
			15105na					
2300	0000		Sierra Leone, SLBS	3316do				
2300	0000		Singapore, SBC Radio One		6150do			
2300	0000		Sri Lanka, SLBC	4940do				
2300	0000		UK, BBC World Service	3915as	5965as	5975am	6195as	7105as
			9580eu 9740as	11685as	11945as	11955as	12095af	15390ca
			15400af					
2300	0000		USA, Armed Forces Network		4319usb	4993usb	5765usb	6350usb
			6458usb 10320usb	10940usb	12579usb	12689usb	13362usb	
2300	0000		USA, KAUJ Dallas TX		13815va			
2300	0000		USA, KTBN Salt Lk City UT		7505na			
2300	0000		USA, KWHR Naalehu HI	17510as				
2300	0000		USA, Voice of America	7215va	9705va	9770va	11760va	13765va
			15185va 15290va	15305va	17740va	17820va		
2300	0000		USA, WBCQ Kennebunk, ME	7415na	9355na			
2300	0000		USA, WEWN Birmingham AL	9355na	9975eu	15745na	17595eu	
2300	0000		USA, WHRA Greenbush ME	7580eu				
2300	0000		USA, WHRI Noblesville IN	5745va	9495am	13760va		
2300	0000		USA, WINB Red Lion PA	13570am				
2300	0000		USA, WJIE Louisville KY	7490am	13595am			
2300	0000	smtwhf	USA, WRMI Miami FL	7385am				
2300	0000		USA, WRMI Miami FL	9955am				
2300	0000		USA, WRNO New Orleans LA	7355am				
2300	0000		USA, WSHB Cypress Creek SC	13770eu	15285sa			
2300	0000		USA, WTJC Newport NC	9370na				
2300	0000	as	USA, WWBS Macon GA	11900na				
2300	0000		USA, WWCR Nashville TN		5070na	7465na	9475na	
			13845na					
2300	0000		USA, WWRB Manchester TN	6890va	9320va	9400va	12172va	
2300	0000		USA, WYFR Okeechobee FL	5895sa	11740na	11855sa	15255sa	
			17750sa					
2300	0000	vi	Vanuatu, Radio	4960do	7260do			
2300	0000	vi	Vanuatu, Radio	4960do	7260do			
2300	0000		Zambia, Christian Voice	4965af				
2300	2230		Mexico, Radio Mexico Intl		9705am	11770am		
2300	2330		Cuba, Radio Havana	9550am				
2300	2330		Nigeria, Radio/Enugu	6025do				
2300	2330		Nigeria, Radio/Kaduna	4770do	6090do			
2300	2330		Nigeria, Radio/Lagos	3326do	4990al			
2300	2330	vi	Solomon Islands, SIBC	5020do				
2300	2330		USA, Voice of America	7190va	7200va	9545va	11925va	13755va
2300	2345		Germany, Deutsche Welle		9815as	12000as	17560as	21790as
2303	2310		Croatia, Croatian Radio	9925na				
2330	0000		Canada, Radio Canada Intl		6175na	9590na	13670na	
			17695na					
2330	0000		Lithuania, R Vilnius	9875eu				
2330	0000		Netherlands, Radio	6165na	9845na			
2330	0000	a	Russia, Radio Ezra	17665na				
2330	0000		Switzerland, Swiss R Intl	9885sa	11905sa			
2330	0000		USA, Voice of America	7190va	7200va	7225va	7260va	9545va
			11805va 11925va	13735va	13775va	15205va		
2330	2345	vi	Libya, Voice of Africa	15435irr				
2330	2357		Vietnam, Voice of	9840as	12020as			
2345	0000	vi	Pakistan, Radio	11580as	15455as			



Note: Additional listings for BBC World Service reflect projected best times for hearing alternative streams. A higher quality receiver with use of an external antenna will be necessary for listenable reception and, even then, only when conditions are favorable. In general, Asian streams are the better bet on the west coast; other streams on the east coast.

[BBC stream abbreviations: (am)=Americas; (eu)=Europe/N. Africa; (me)=Middle East, SW Asia, CIS (former Soviet Union); (wcaf)=West and Central Africa; (esaf)=East and Southern Africa; (af)=both (wcaf) and (esaf); (sas)=South Asia; (eas)=East Asia.]

0000 UTC/ 8pm E/5pm P - Page 43 Freqs

NEWSCASTS (*extended)

0000	BBC(am)	S/M	World Briefing*
		T-A	News
	BBC(eas/sas)	D	World Briefing*
	R. Australia	D	News
	R. Japan	D	World News
	R. New Zealand Int.	S/A	News
		M-F	Midday Report*
	R. Prague	D	News
	Spanish Foreign R.	T-A	Ibero-American News*
	VOA News Now	T-A	News
0030	BBC(am)	M	The World Today*
	BBC(sas)	M-F	The World Today*
	VOA News Now	T-A	News Headlines

CURRENT AFFAIRS MAGAZINES/FEATURES

0010	R. Australia	W	The National Interest
		H	Background Briefing (documentaries)
		T-A	44 Minutes
0015	R. Japan	T-A	Focus
0015	VOA News Now	T-A	Focus
0030	BBC(am/eas/sas)	S	Agenda (trends)
0045	BBC(eas)	M	Letter from America
		TWFA	Analysis (one issue)
		H	From Our Own Correspondent

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)

0000	R. Netherlands	A	A Good Life (development issues)
0028	HCB	T-A	Money Minute
0020	R. Prague	F	Economic Report
0030	BBC(eas)	M	World Business Review
		T-A	World Business Report
	R. Netherlands	W	A Good Life (development issues)

BUSINESS/ECONOMICS/SCIENCE/TECHNOLOGY (incl. Health & Environment)

0000	R. Netherlands	T	Research File
0010	R. Australia	T	The Science Show
0030	R. Netherlands	F	Research File

ARTS & CULTURE

0000	R. Netherlands	F	Aural Tapestry
0005	BBC(am)	T	Meridian-Masterpiece (ideas)
		W	Meridian-Screen (cinema)
		H	Meridian-Writing (books)
		A	Arts in Action
	R. Prague	S	Readings from Czech Literature
0010	R. Australia	M	Away! (Aboriginal culture)
	R. Prague	M	The Arts
0030	R. Netherlands	M	Aural Tapestry

LOCAL LIVES AND VIEWS

0000	R. Netherlands	M	Dutch Horizons
	YLE R. Finland	S	Capital Weekend
0005	R. Prague	M	Letter from Prague
		T-A	News View
0010	R. Australia	F	Hindsight (Australian history)
	R. Japan	M	Weekend Square
	R. New Zealand Int.	S	This Week in Parliament
		A	Focus on Politics
0015	R. Prague	T	One on One (interview)
		W	Talking Point or
			Insight Central Europe
0030	R. Australia	A	Country Breakfast (rural life)
	R. Netherlands	S	Roughly Speaking (Euro youth)
		T	Euroquest (Europe in context)
		H	Dutch Horizons
	R. New Zealand Int.	S	Spectrum (life in NZ)
0033	VOA News Now	T-A	Coast to Coast

INFORMATIONAL FEATURES

0000	R. Netherlands	H	Documentary
0005	R. Australia	S	The Europeans
0030	BBC(sas)	A	Reporting Religion
	R. Netherlands	A	Documentary
0034	R. Australia	S	Sharing Power (Pacific gov't. structures)
0047	Spanish Foreign R.	T-A	Spanish Language Course

MUSIC

0000	R. Netherlands	S/W	Musik 52-15 (world/folk)
	WBCQ(7415kHz)	S	Different Kind of Oldies Show
		M	Radio New York International
	WWCR(3210kHz)	S	Big Backyard (Australian country)
0005	BBC(am)	F	The Music Biz (the industry)
0010	R. Prague	S	Saturday Music (classical/folk/jazz)
0030	BBC(am)	T	Charlie Gillett (world)
		W	UK Top 20 (pop/rock)
		H	Revolver (artist selections)
		F	John Peel (eclectic)
		A	Jazzmatazz
	R. New Zealand Int.	A	The Sampler (latest CDs)

SWL, MEDIA AND COMMUNICATIONS

0000	WBCQ(7415kHz)	W	Off the Hook (computer hacking)
		A	Allan Weiner Worldwide (station manager)
	WHRI(5745kHz)	S	DXing with Cumbre
0047	Spanish Foreign R.	A	Radio Waves

LISTENER CONTACT/INTERACTIVE

0005	R. Australia	A	Feedback
0010	R. Japan	S	Hello from Tokyo
0015	R. Prague	M	Mailbox
0030	HCB	S	Saludos Amigos
0035	Spanish Foreign R.	A	Radio Club
0047	Spanish Foreign R.	M	Radio Club (opt.)

SPORT

0020	BBC(am)	S/M	Sports Roundup
	BBC(sas)	D	Sports Roundup
0023	VOA News Now	T-A	Sports

0100 UTC/ 9pm E/6pm P - Page 43 Freqs

NEWSCASTS (*extended)

0100	BBC(am/eas)	S	The World Today*
		M-A	News
	BBC(sas)	D	The World Today*
	China R. Int.	D	News
	Deutsche Welle	D	News
	HCB	T-A	Latin American & World News
	R. Australia	D	News
	R. Budapest	D	News
	R. Canada Int.	T-A	News
	R. Habana Cuba	D	International News
	R. Netherlands	S/M	News
	R. New Zealand Int.	D	News
	R. Prague	D	News
	VOA News Now	T-A	News
	Voice of Russia	D	News
	Voice of Vietnam	D	News
0110	R. Habana Cuba	T-S	National News
0130	R. Habana Cuba	T-S	News Bulletin
	RTE, Ireland	T-S	The News at Six*
	VOA News Now	T-A	News Headlines
	VOA Spec. Eng.	T-A	News
	Voice of Russia	D	News

CURRENT AFFAIRS MAGAZINES/FEATURES

0100	R. Netherlands	T-A	Newsline
0105	BBC(eas)	T-A	Outlook
	Deutsche Welle	M	Talking Point (journalists)
		T-A	Newslink
	R. Australia	S	Correspondents' Report
	R. Australia	A	Asia Pacific
	R. Netherlands	M	Wide Angle
0110	China R. Int.	M-F	Current Affairs
	R. Australia	M-F	Asia Pacific
	R. Habana Cuba	M	Weekly Review
0111	Voice of Russia	S	News and Views
		M	Sunday Panorama
		T-A	Commonwealth Update
0115	R. Habana Cuba	T-S	Viewpoint
0130	BBC(sas)	S	Assignment (in-depth)
	Deutsche Welle	T	Insight
	R. Austria Int.	D	Report from Austria
0133	VOA News Now	A	VOA News Review
0135	R. Canada Int.	S/A	Canada in the World
		T	Media Zone

0140	R. Habana Cuba	A	Weekly Review
	VOA Spec. Eng.	A	In the News

BUSINESS/ECONOMICS

0105	R. Canada Int.	S	Business Sense
0110	R. Budapest	M	Europe Unlimited (trade-monthly)
0115	China R. Int.	S	Reports on Developing Countries
0120	R. Prague	F	Economic Report
0130	China R. Int.	T	Biz China
0133	VOA News Now	T-F	Business News
0135	R. Canada Int.	F	Business Sense

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0105	BBC(am)	T	Health Matters
		W	Go Digital (technology)
		H	Discovery (research)
		F	One Planet (ecology)
		A	Science in Action (magazine)
0130	Deutsche Welle	W	Man and Environment
	R. Australia	M	The Health Report
0140	VOA Spec. Eng.	T	Agriculture Today
		W/H	Science Report
		F	Environment Report
0145	VOA Spec. Eng.	T	Science in the News
		W	Explorations
0150	R. Habana Cuba	M	Breakthrough

ARTS & CULTURE

0105	R. New Zealand Int.	S	At the Movies
	R. Prague	S	Readings from Czech Literature
0110	R. Budapest	M	Spotlight (monthly)
	R. Prague	M	The Arts
0115	Deutsche Welle	M	Arts on the Air
0120	China R. Int.	S	In the Spotlight
0130	R. Australia	A	Arts with Julie Copeland
	R. New Zealand Int.	S	Bookmarks
0135	R. Canada Int.	M/H	Spotlight
0145	VOA Spec. Eng.	A	American Stories
		H	The Making of a Nation

LOCAL LIVES AND VIEWS

0105	R. Canada Int.	T-A	Canada Today
	R. Netherlands	S	Europe Unzipped
	R. Prague	M	Letter from Prague
		T-A	News View
		D	Current Affairs
0110	HCB	T-A	Studio 9 (Latin America)
	R. Budapest	S	Insight Central Europe
		M	Heading for Hungary (monthly)
		T-A	Hungary Today
0115	Deutsche Welle	S	Inside Europe
	R. Prague	T	One on One (interview)
		W	Talking Point or Insight Central Europe
0124	Voice of Russia	M	Russia: People and Events
0130	BBC(eas)	S	In Praise of God (worship service)
	BBC(sas)	A	People and Politics
	China R. Int.	M	People in the Know
		W	China Horizons
		F	Life in China
		H	Living in Germany
0132	Voice of Russia	S	Moscow Yesterday and Today
0135	R. Austria Int.	S	Insight Central Europe
		M	Network Europe
0140	R. Habana Cuba	T/H/F	Caribbean Outlook
0145	BBC(am)	S	Letter from America
	VOA Spec. Eng.	F	American Mosaic
0154	Voice of Russia	H	Russia: People and Events

INFORMATIONAL FEATURES

0105	Deutsche Welle	M	Religion and Society
0115	Deutsche Welle	A	German by Radio
0130	BBC(am)	T	Everywoman (magazine)
		W	Omnibus (documentaries)
		F	People and Places
		A	At the Edge of Asia (about S. Korea/Japan)
	China R. Int.	H	Voices from Other Lands
	R. Australia	T	The Law Report
		W	The Religion Report
0132	Voice of Russia	A	Christian Message from Moscow
0145	BBC(eas)	A	Patterns of Faith
0145	VOA News Now	T-F	Dateline (documentary)

MUSIC

0105	R. New Zealand Int.	M-F	Cadenza (light classics)
0110	R. Prague	S	Saturday Music (classical/folk/jazz)
0110	HCB	A	Musica del Ecuador (within "Studio 9")
0130	BBC(am)	S	Music Review (magazine)
	R. Australia	S	Oz Sounds
0132	Voice of Russia	T	Folk Box
		W	Jazz Show

Shortwave Guide



0146 Voice of Russia
H Musical Portraits
F Yours for the Asking
F Music At Your Request

ENTERTAINMENT/DRAMA/VARIETY

0100 WBCQ(7415kHz) S Marion's Attic (vintage recordings)
A Tasha Takes Control
0105 BBC(am) M Wright Around the World (pop requests)
0110 Voice of Vietnam S Sunday Show
0132 Voice of Russia M Timelines
0145 BBC(eas) M-F Off the Shelf (book readings)

SWL, MEDIA AND COMMUNICATIONS

0100 HCJB S DX Partyline
0105 R. Canada Int. M CIX Report (biweekly)
0120 HCJB H Ham Radio Today (within "Studio 9")
R. Budapest A DX Corner
0130 R. Australia H The Media Report
0135 R. Canada Int. W CIX Report (biweekly)
0140 R. Habana Cuba S/W DXers Unlimited
0145 WWCR(5070 kHz.) S Ask WWCR

LISTENER CONTACT/INTERACTIVE

0100 R. Canada Int. M Maple Leaf Mailbag
HCJB M Musical Mailbag
0110 R. Budapest M And the Gatepost (monthly)
0115 R. Prague M Mailbox
Voice of Vietnam H Letterbox
0120 China R. Int. A Listeners' Garden
0130 HCJB S Musical Mailbag
0135 R. Canada Int. W Maple Leaf Mailbag
0140 R. Habana Cuba M Mailbag Show
0150 R. Austria Int. S Listeners' Letters

SPORT

0115 Deutsche Welle F Hard to Beat: The World of Sport
0123 VOA News Now T-F Sports Report
0130 BBC(am) H Sports International (magazine)
R. Australia F The Sports Factor
RTE Ireland S/W Sportsnews
0135 R. Habana Cuba T-A Time Out

0200 UTC/ 10pm E/7pm P - Page 44 Freqs

NEWSCASTS (* extended)

0200 BBC(am/sas/me/esaf) D The World Today*
BBC(eas) S/A The World Today*
M-F News
R. Australia D News
R. Habana Cuba D International News
R. Korea Int. D News
R. New Zealand Int. D News
R. Taipei Int. D News
Voice of Russia D News
0210 R. Habana Cuba T-S National News
0230 R. Budapest D News
R. Habana Cuba T-S News Bulletin
Voice of Russia D News in Brief
Voice of Vietnam D News

CURRENT AFFAIRS MAGAZINES/FEATURES

0210 R. Australia M-F The World Today
0215 R. Korea Int. T-A Seoul Calling
0230 BBC(am) M Assignment (in-depth)
BBC(eas/sas/me/esaf) S From Our Own Correspondent
R. Sweden T-A 60 Degrees North
0245 BBC(am) TWFS Analysis (one issue)
H From Our Own Correspondent

BUSINESS/ECONOMICS

0211 Voice of Russia W/A Newmarket
0230 BBC(am) S World Business Review
T-A World Business Report
BBC(sas/me/esaf) A Global Business
0240 R. Budapest M Europe Unlimited (trade-monthly)
0245 R. Sweden H Money Matters

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0200 WBCQ(7415kHz) S Pocket Calculator (consumer electronics)
0205 R. New Zealand Int. S Eureka!
0211 Voice of Russia T/F Science and Engineering
0230 R. Australia A Earthbeat (environment)
0245 R. Sweden F Greenscan (ecology-2nd wk.)
Heartbeat (health-3rd wk.)

ARTS & CULTURE

0205 BBC(eas) M Meridian-Masterpiece (ideas)
T Meridian-Screen (cinema)

0215 R. Taipei Int. W Meridian-Writing (books)
0230 R. Sweden F Arts in Action (global)
0240 R. Budapest T Culture Express
S Spectrum (3rd wk.)
M Spotlight (monthly)

LOCAL LIVES AND VIEWS

0215 R. Taipei Int. W Taiwan Today
F Taipei Magazine
0230 R. Korea Int. S Figure of the Week
W Korean Kaleidoscope
S Weekend (Europe magazine-1st wk.)
Sweden Today (2nd wk.)
Studio 49 (topical discussion-4th wk.)
Voice of Vietnam D Current Affairs
0232 Voice of Russia M This is Russia
T Kaleidoscope
H Moscow Yesterday and Today
0235 R. Budapest S Insight Central Europe
M Heading for Hungary
T-A Hungary Today
0245 R. Sweden F Nordic Report (1st wk.)
The S-Files (things Swedish-4th wk.)
Review of the Newsweek
R. Taipei Int. A Kaleidoscope (life in Taiwan)

INFORMATIONAL FEATURES

0205 R. Australia A Background Briefing (documentary)
0215 R. Taipei Int. S Great Wall Forum (mainland issues)
0232 Voice of Russia F Russian by Radio
0235 R. Habana Cuba S The World of Stamps
0245 R. Taipei Int. M-F Let's Learn Chinese

MUSIC

0205 BBC(eas) H The Music Biz (industry)
0206 R. New Zealand Int. M-F Wayne's Music (personal selections)
0210 R. Habana Cuba M From Habana
R. Korea Int. M Korean Pop Interactive (requests)
0215 R. Taipei Int. M Jade Bells and Bamboo Pipes (traditional)
0230 BBC(eas) M Charlie Gillett (world)
T UK Top 20 (pop/rock)
W Revolver (artist selection)
H John Peel (eclectic)
F Jazzmatuzz
A Music Review (magazine)
R. Habana Cuba M The Jazz Show or Top Tens
R. Korea Int. A Notes of Nostalgia (traditional)
R. Sweden M Sounds Nordic (exc. 1st wk.)
0232 Voice of Russia S Songs from Russia
W Musical Portraits

ENTERTAINMENT/DRAMA/VARIETY

0205 R. Australia S Margaret Throsby Interview
WWCR(3210kHz) M Golden Age of Radio Theatre
0232 Voice of Russia A Audio Book Club

SWL, MEDIA AND COMMUNICATIONS

0230 R. Korea Int. M Multiwave Feedback
WWCR(5070kHz) S World of Radio
0250 R. Budapest A DX Corner

LISTENER CONTACT/INTERACTIVE

0211 Voice of Russia S/W/H Moscow Mailbag
0230 R. Korea Int. S From Us to You
R. Sweden M In Touch with Stockholm (1st wk.)
R. Taipei Int. S Mailbag Time
0240 R. Budapest M And the Gatepost
0246 Voice of Russia S You Write to Moscow

SPORT

0205 R. Australia S/A Grandstand (live sports action*)
0230 R. Korea Int. H Sport
0235 R. New Zealand Int. S Live Sport (in season)
0245 R. Sweden T Sportsman
(*special on 9660, 12080, 17580, 17750, 21725 kHz. only.)

0300 UTC/ 11pm E/8pm P - Page 44 Freqs

NEWSCASTS (* extended)

0300 BBC(am) S/M World Briefing*
T-A News
BBC(me/af) D World Briefing*
BBC(eas) S World Briefing*
M-A News
China R. Int. D News
Deutsche Welle D News
R. Australia D News
R. Habana Cuba D International News

R. New Zealand Int. S/A News
M-F Pacific Regional News
R. Prague D News
R. Taipei Int. D News
Voice of Russia D News
0310 R. Habana Cuba T-S National News
0330 R. Habana Cuba D News Bulletin
Voice of Russia D News in Brief
Voice of Vietnam D News

CURRENT AFFAIRS MAGAZINES/FEATURES

0305 Deutsche Welle S/W Weekend Review
T-A Newslink
0310 China R. Int. M-F Current Affairs
R. Habana Cuba M Weekly Review
0311 Voice of Russia M Sunday Panorama
T-A News & Views
T-S Viewpoint
0315 R. Habana Cuba M Network Africa
0330 BBC(af) M-F Insight (international affairs)
Deutsche Welle T Pacific Correspondent
R. New Zealand Int. F 60 Degrees North
R. Sweden T-A Asia Pacific (from R. Australia)
0340 R. Habana Cuba T/F Caribbean Outlook
A Weekly Review
TWFA Analysis
H From Our Own Correspondent

BUSINESS/ECONOMICS

0315 China R. Int. S Report on Developing Countries
R. Taipei Int. M Taiwan Economic Journal
0320 R. Prague F Economic Report
0330 BBC(me) M World Business Review
T-A World Business Report
China R. Int. T Biz China
R. New Zealand Int. W Tradewinds
0345 R. Sweden H Money Matters

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0305 BBC(eas) M One Planet (ecology)
T Science in Action (magazine)
W Health Matters
H Go Digital (technology)
F Discovery (research)
Spectrum
0315 Deutsche Welle S Science in Action
0330 BBC(me) S Man and Environment
R. Sweden W All in the Mind (the human brain)
R. Australia S Greenscan (ecology-2nd wk.)
0345 R. Sweden F Heartbeat (health-2nd wk.)
Breakthrough

ARTS & CULTURE

0305 R. Prague S Readings from Czech Literature
0310 R. Prague M The Arts
0315 Deutsche Welle M Arts on the Air
R. Taipei Int. T Culture Express
0320 China R. Int. S In the Spotlight
0330 BBC(am) F Chance to Dance (ballet school)
HCJB F The Book & the Spade (religion & archaeology)
R. Sweden S Spectrum (3rd wk.)
Voice of Russia W/F Russian history/culture program

LOCAL LIVES AND VIEWS

0305 R. Australia A Rural Reporter (outback)
W Pacific Report
R. New Zealand Int. F Dateline Pacific
R. Prague M Tagata o te Moana (Pacific magazine)
A Letter from Prague
T-A News View
0315 R. Prague T One on One (interview)
W Talking Point or
Insight Central Europe
0320 R. Australia M-F Pacific Focus
0324 Voice of Russia M Russia: People and Events
0330 BBC(af) S Postmark Africa
A This Week and Africa or African Quiz
China R. Int. M People in the Know
W China Horizons
F Life in China
Deutsche Welle H Living in Germany
R. Sweden S Weekend (Europe magazine-1st wk.)
Sweden Today (2nd wk.)
Studio 49 (topical discussion-4th wk.)
Life Unusual
R. Taipei Int. H Kaleidoscope (Russian events)
0332 Voice of Russia S Nordic Report (1st wk.)
0345 R. Sweden F The S-Files (things Swedish-4th wk.)
Review of the Newsweek

Shortwave Guide



INFORMATIONAL FEATURES

0315	R. Taipei Int.	S	Great Wall Forum (mainland issues)
0320	China R. Int.	H	Voices from Other Lands
0330	BBC(am/me)	S	Reporting Religion
	BBCWS(am)	T	What is Civil Society?
		H	Stolen Lives (tragedy)
		A	Patterns of Faith
	BBC(eas)	S	Reporting Religion
		M	People and Places
		T	At the Edge of Asia (about S. Korea/Japan)
		W	Everywoman (magazine)
		H	Omnibus (documentaries)
	Deutsche Welle	A	German by Radio
0332	R. Australia	A	Time to Talk (Pacific island nations)
	Voice of Russia	T/H/S	20th Century
0345	BBC(me)	M	Patterns of Faith

MUSIC

0300	HCB	S	Inspirational Classics
	WBCQ(7415kHz)	S	Zombo's Mondo Record Party (eclectic)
0305	BBC(am)	T	Jazzmatazz
		W	Charlie Gillett (world)
		H	John Peel (eclectic)
		F	Composer of the Month
0305	R. New Zealand Int.	T	Top 5 (pop/rock)
0310	R. Prague	S	Saturday Music (classical/folk/jazz)
0315	HCB	T-A	Rendezvous (inspirational)
0330	R. New Zealand Int.	T	New Releases
	R. Sweden	M	Sounds Nordic (rock-exc. 1st wk.)
	WRM(7385kHz)	S	Drive-In Double Feature (eclectic)
0340	R. Australia	M	Australian Music Show (modern rock)
		T	Music Deli (international)
		W	Blacktracker (Aboriginal)
		H	Oz Country Style
		F	Jazz Notes
0345	HCB	W	Wonderful Words of Life (hymns)

ENTERTAINMENT/DRAMA/VARIETY

0305	BBC(am)	A	Hitch-Hiker's Guide to the Galaxy
	BBC(eas)	A	Wright Around the World (requests)
0330	BBC(am)	M	Westway Omnibus (two episodes)
	HCB	T	Unshackled (radio's oldest drama series)
0332	Voice of Russia	M	Audio Book Club
0340	Voice of Vietnam	M	Sunday Show
0345	BBC(am)	T-A	Off the Shelf (book readings)

SWL, MEDIA AND COMMUNICATIONS

0300	WWCR(5070 kHz)	S	Spectrum
0305	R. New Zealand Int.	H	Pacific Divers Report (biweekly)
		RNZI	Talk (meet the staff-biweekly)
0330	WHRI(7315kHz)	M	Dixing with Cumbre
	WRM(7385kHz)	M	Wavescan
0340	R. Habana Cuba	S/W	Dixers Unlimited

LISTENER CONTACT/INTERACTIVE

0305	R. Australia	S	Feedback
	R. New Zealand Int.	H	Mailbox (biweekly)
0320	China R. Int.	A	Listeners' Garden
	R. Prague	M	Mailbox
0330	BBC(am)	W	Write On
	R. Sweden	M	In Touch with Stockholm (1st wk.)
	R. Taipei Int.	A	Mailbag Time
0340	R. Habana Cuba	H	Mailbag Show
0345	BBC(me)	M	Write On (exc. 2nd or 3rd wk.)
	BBC(sas)	A	Write On (exc. 2nd or 3rd wk.)

SPORT

0300	Channel Africa	A	Channel Africa Sport
	R. Australia	S/A	Grandstand (live action)*
	R. New Zealand Int.	S/A	Live Sport (in season)
0310	R. Australia	M-F	Sport (daily report)
0320	BBC(am)	S/M	Sports Roundup
	BBC(me/af)	D	Sports Roundup
	BBC(eas)	S	Sports Roundup
0330	BBC(eas)	F	Sports International (magazine)
	Deutsche Welle	F	Hard to Beat: The World of Sport
	R. New Zealand Int.	H	The World in Sport
0335	R. Habana Cuba	T-A	Time Out
0345	R. Sweden	T	Sportsman

(*special on 9660, 12080, 17580, 21725 kHz. only)

0400 UTC/ 12am E/9pm P - Page 45 Freqs

NEWSCASTS (*extended)

0400	BBC(am/eas/eu/me/af)	D	The World Today*
	China R. Int.	D	News
	HCB	T-A	Latin American & World News
	R. Australia	D	News
	R. Habana Cuba	D	International News

	R. New Zealand Int.	D	News
	R. Vlaanderen Int.	T-S	News
	Voice of Russia	D	News
0430	R. Habana Cuba	T-S	News Bulletin
	R. Netherlands	S/M	News
	Voice of Russia	D	News in Brief

CURRENT AFFAIRS MAGAZINES/FEATURES

0410	China R. Int.	M-F	Current Affairs
	HCB	T-A	Studio 9 (on Latin America)
	R. Habana Cuba	T-A	Spotlight on the Americas
0430	BBC(am/eas/me)	A	Assignment
	BBC(af)	M-F	Network Africa
	R. Netherlands	T-A	Newsline

BUSINESS/ECONOMICS

0411	Voice of Russia	H	Newmarket
0413	R. Vlaanderen Int.	F	Economics
0415	China R. Int.	S	Report on Developing Countries
0430	BBC(am/eu)	S	Global Business
	China R. Int.	T	Biz China

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0405	R. Australia	A	Pacific Focus-Environment
0411	Voice of Russia	W/A	Science and Engineering
0413	R. Vlaanderen Int.	W	Green Society (ecology)
0430	R. Australia	A	The Buzz (technology)

ARTS & CULTURE

0405	R. Australia	S	Pacific Focus-Arts
0413	R. Vlaanderen Int.	H/A	Around the Arts
0420	China R. Int.	S	In the Spotlight
0430	R. Australia	S	Arts with Julie Copeland

LOCAL LIVES AND VIEWS

0404	R. Vlaanderen Int.	T-A	Belgium Today
0405	R. New Zealand Int.	M-F	In Touch with New Zealand
0408	R. Vlaanderen Int.	M	Tourism in Flanders
0413	R. Vlaanderen Int.	T	Focus on Europe
0418	R. Vlaanderen Int.	H	Around Town
		A	Tourism in Flanders
0420	R. Prague	W	Talking Point
0430	BBC(me)	S	In Praise of God (worship service)
	BBC(esaf)	A	Talkabout Africa
	BBC(wcaf)	A	African Quiz or This Week and Africa
	BBC(eu)	A	Network Europe (magazine)
	China R. Int.	M	People in the Know
		W	China Horizons
		F	Life in China
0432	Voice of Russia	W	Moscow Yesterday and Today
0435	R. Netherlands	S	Europe Unzipped
0455	R. Netherlands	S	Insight (commentary)

INFORMATIONAL FEATURES

0418	R. Vlaanderen Int.	F	International Report
0420	China R. Int.	H	Voices from Other Lands
0435	R. Habana Cuba	S	The World of Stamps

MUSIC

0400	R. Vlaanderen Int.	S	Music from Flanders
0405	R. New Zealand Int.	A	Home Grown (NZ music/performers)
0410	R. Habana Cuba	M	From Habana
0411	Voice of Russia	M	Musical Portraits (history)
0424	R. Vlaanderen Int.	M-A	Soundbox (Flemish rock)
0430	HCB	A	Musica del Ecuador
		A	Jazz Notes
	R. Australia	M	The Jazz Show or Top Tens
	R. Habana Cuba	M	Jazz Show
0432	Voice of Russia	T	Yours for the Asking
		H	Folk Box
		T	Music At Your Request

ENTERTAINMENT/DRAMA/VARIETY

0400	WBCQ(7415 kHz.)	M-A	Amos 'n Andy (classic radio comedy)
0405	R. New Zealand Int.	S	Playhouse (radio theatre)
0410	R. Australia	M-F	Margaret Throsby Interview
0430	BBC(eas)	S	Hitch-Hiker's Guide to the Galaxy
	BBC(af)	S	African Performance (plays for radio)
0432	Voice of Russia	F	Audio Book Club
		S/A	Timelines

SWL, MEDIA AND COMMUNICATIONS

0400	HCB	S	DX Partyline
	R. Vlaanderen Int.	M	Radio World
	WBCQ(7415kHz)	S	Tom and Darryl (electronic media)
	WWCR	S	Cyber Line
0420	HCB	H	Ham Radio Today (within "Studio 9")

LISTENER CONTACT/INTERACTIVE

0400	HCB	M	Musical Mailbag
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0411	Voice of Russia	T/F	Moscow Mailbag
0414	R. Vlaanderen Int.	M	Brussels 1043
0420	China R. Int.	A	Listeners' Garden
0430	HCB	S	Saludos Amigos
	R. Habana Cuba	M	The Mailbag Show
	WRM(7345kHz)	S	Viva Miami
0435	R. Netherlands	M	Sincerely Yours
0445	WWCR(5070 kHz.)	M	Ask WWCR

SPORT

0400	R. Australia	S/A	Grandstand (live action)*
	R. New Zealand Int.	S/A	Live Sport (in season)
0418	R. Vlaanderen Int.	T	Sports
0430	China R. Int.	T	Sports World
0450	BBC(am/eas/eu/me)	M-F	Sports Roundup

(*special on 9660, 12080, 17580, 17750, 21725 kHz. only.)

0500 UTC/ 1am E/10pm P - Page 45 Freqs

NEWSCASTS (*extended)

0500	BBC(eu/me/af/eas)	D	The World Today*
	China R. Int.	D	News
	Deutsche Welle	D	News
	R. Australia	D	News
	R. Habana Cuba	D	International News
	R. Japan	D	News
0510	R. Habana Cuba	T-A	National News
0530	R. Habana Cuba	T-A	News Bulletin
	Voice of Nigeria	S/A	News

CURRENT AFFAIRS MAGAZINES/FEATURES

0500	R. New Zealand Int.	M-F	Checkpoint
0505	Deutsche Welle	S	Talking Point (journalists)
		T-A	Newslink
	WWCR(5070kHz)	M	A View from Europe
0510	China R. Int.	M-F	Current Affairs
	R. Australia	M-F	Pacific Beat
	R. Habana Cuba	M	Weekly Review
0515	R. Habana Cuba	T-S	Viewpoint
	R. Japan	M-F	44 Minutes
0530	BBC(af)	M-F	Network Africa
	BBC(eu)	A	From Our Own Correspondent
	Deutsche Welle	T	Insight (international affairs)
0540	R. Habana Cuba	T/F	Caribbean Outlook
		A	Weekly Review
0545	BBC(me/eu)	A	Letter from America

BUSINESS/ECONOMICS

0500	R. Netherlands	A	A Good Life (development issues)
0505	R. Australia	A	Pacific Focus-Business
0515	China R. Int.	S	Report on Developing Countries
	Deutsche Welle	S	Money Talks
0530	BBC(me)	S	Global Business
		A	World Business Review
	China R. Int.	T	Biz China

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0500	R. Netherlands	T	Research File
0530	Deutsche Welle	W	Man and Environment

ARTS & CULTURE

0500	R. Netherlands	F	Aural Tapestry
0520	China R. Int.	S	In the Spotlight
0530	BBC(af)	S	Artbeat (arts in Africa)

LOCAL LIVES AND VIEWS

0500	R. Netherlands	S	Roughly Speaking (Euro youth)
		M	Dutch Horizons
0530	BBC(af)	S	Performance Plus (discussion)
	BBC(esaf)	A	Africa Quiz or This Week and Africa
	BBC(wcaf)	A	Talkabout Africa
	China R. Int.	M	People in the Know
		F	China Horizons
	Deutsche Welle	H	Living in Germany

INFORMATIONAL FEATURES

0500	HCB	W	The Book & the Spade (archaeology)
	R. Netherlands	H	Documentary
0505	Deutsche Welle	M	Religion and Society
0510	R. New Zealand Int.	S	Touchstone (religion/spirituality)
0515	Deutsche Welle	M	Cool (teen magazine)
0530	BBC(eas)	A	World Learning (educational)
		M	What is Civil Society
		W	Stolen Lives (tragedy's effects)
		H	Chance to Dance (ballet school)
		F	What's the Problem (advice)
	China R. Int.	H	Voices from Other Lands

Shortwave Guide



	Deutsche Welle	A	German by Radio
	R. Australia	A	Lingua Franca (about language)
MUSIC			
0500	HCB	S	Inspirational Classics
	R. Netherlands	W	Music 52-15
	WWCR(5070kHz)	S	World Wide Country Music
0505	R. New Zealand Int.	A	Home Grown (from 0405)
	WWCR(3210kHz)	A	Rock the Universe (Christian rock)
0510	R. Japan	S	Pop Joins the World
0530	HCB	A	Walkin' in the Sunshine (country)
	R. Australia	S	Fine Music Australia (classical)

ENTERTAINMENT/DRAMA/VARIETY

0530	BBC(eu)	S	Pick of the World (BBC's best)
	HCB	M	Unshackled (oldest drama on radio)
		H	Adventures in Odyssey (children's stories)
0545	BBC(eas)	M-F	Off the Shelf (book readings)
	R. Australia	A	Short Story

SWL, MEDIA AND COMMUNICATIONS

0500	WWCR(3210 kHz.)	M	World of Radio
	WHRI	A	Dixing with Cumbre
0540	R. Habana Cuba	S/W	Dixers Unlimited

LISTENER CONTACT/INTERACTIVE

0500	HCB	S	Saludos Amigos
	WWCR(5070 kHz.)	T	Ask WWCR
0510	R. Japan	A	Hello from Tokyo
0520	China R. Int.	A	Listeners' Garden
0530	BBC(eas)	T	Write On
0540	R. Habana Cuba	M/H	Mailbag Show

SPORT

0500	R. Australia	S/A	Grandstand (live action)*
0505	R. Australia	A	Pacific Focus-Sport
0530	Deutsche Welle	F	Hard to Beat: The World of Sport
	R. Australia	M-F	Sport (daily report)
0535	R. Habana Cuba	T-A	Time Out

(*special on 9660, 12080, 17580, 17750, 21725 kHz. only.)

0600 UTC/ 2am E/11pm P - Page 46 Freqs

NEWSCASTS (*extended)

0600	BBC(eu/wcaf)	D	World Briefing*
	BBC(me/esaf)	S	World Briefing*
		M-A	News
	BBC(eas)	S/A	World Briefing*
		M-F	News
	R. Australia	D	News
	R. Habana Cuba	D	International News
	R. Japan	D	News
	R. New Zealand Int.	D	News
0630	R. Habana Cuba	T-S	News Bulletin

CURRENT AFFAIRS MAGAZINES/FEATURES

0605	BBC(me/esaf)	T-A	Outlook
0610	R. Habana Cuba	T-S	Spotlight on the Americas
0615	R. Japan	M-F	Asian Top News (region's radio)
0630	BBC(eu/me/af)	S	Agenda (trends)
	BBC(wcaf)	M-F	Network Africa
	R. New Zealand Int.	M-F	Worldwatch
0645	BBC(eu)	M	Letter from America
		TWF	Analysis
		H	From Our Own Correspondent

BUSINESS/ECONOMICS

0630	BBC(eu)	M-F	World Business Report
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SCIENCE/TECHNOLOGY (incl. Health & Environment)

0600	R. Habana Cuba	M	Breakthrough
0634	R. Australia	S	Ockham's Razor

ARTS & CULTURE

0605	BBC(eas)	M	Arts in Action (global)
		T	Meridian-Masterpiece (ideas)
		W	Meridian-Screen (cinema)
		H	Meridian-Writing (books)
	R. New Zealand Int.	S	Whenua! (Maori culture)
		M-F	What's Going On

LOCAL LIVES AND VIEWS

0605	R. New Zealand Int.	A	Focus on Politics
0610	R. Japan	S	Weekend Square (Japanese life)
0620	R. Australia	M-F	Pacific Focus
0630	BBC(eu/eas)	A	People and Politics
	BBC(wcaf)	A	African Quiz or This Week and Africa

INFORMATIONAL FEATURES

0605	BBC(eas)	M	Omnibus (documentary)
	R. Australia	S	The Europeans
	WWCR(5070kHz.)	S	This Week in Americana (antiques)
0625	R. Japan	T	Let's Learn Japanese
		H	Brush Up Your Japanese
0635	R. Habana Cuba	S	The World of Stamps
0645	BBC(me/esaf)	A	Patterns of Faith

MUSIC

0600	HCB	T	Chords of Love (sacred)
		A	Wonderful Words of Life (hymns)
	WWCR(3210kHz)	T-F	World Wide Country Radio
0605	BBC(eas)	F	The Music Biz (industry)
	WHRI(7315kHz)	A	Turn Your Radio On
	WWCR(3210kHz)	S	Big Backyard (Australian country)
0610	R. Habana Cuba	M	From Havana (Cuban musicians)
	R. Japan	A	Pop Joins the World
0625	R. Japan	M	Japan Music Log
		W	Japan Musical Treasure Box
		F	Music Beat (pop)
0630	BBC(eas)	M	Jazzmatazz
		T	Charlie Gillett (world)
		W	UK Top 20 (pop/rock)
		H	Revolver (artist selections)
		F	John Peel (eclectic)
	HCB	T-A	Nightsounds (inspirational)
	R. Australia	A	Oz Sounds
	R. Habana Cuba	M	The Jazz Show or Top Tens
0640	R. Australia	M	Australian Music Show (modern rock)
		T	Music Deli (international)
		W	Blacktracker (Aboriginal)
		H	Country Style
		F	Jazz Notes

ENTERTAINMENT/DRAMA/VARIETY

0605	R. New Zealand Int.	A	Saturday Night
0630	BBC(eas)	S	Westway Omnibus (two episodes)
0645	BBC(me/esaf)	M-F	Off the Shelf (readings)
	R. New Zealand Int.	M-F	Storytime

SWL, MEDIA AND COMMUNICATIONS

0600	WWCR(3210kHz)	M	Spectrum
0630	WHRI (5745kHz)	S	Dixing with Cumbre
	WWCR(5070kHz)	S	World of Radio

LISTENER CONTACT/INTERACTIVE

0600	HCB	S	Saludos Amigos
0605	BBC(me/esaf)	M	Talking Point (global phone-in)
	R. Australia	S	Feedback
0645	BBC(esaf)	A	Write On (exc. 2nd or 3rd wk.)

SPORT

0600	R. Australia	S/A	Grandstand (live action)*
0610	R. Australia	M-F	Sport (daily report)
0620	BBC(eu/wcaf)	D	Sports Roundup
	BBC(me/af)	S	Sports Roundup
	BBC(eas)	S/A	Sports Roundup

(*special on 9660, 12080, 17580, 17750, 21725 kHz. only.)

1000 UTC/6am E/3am P - Page 48 Freqs

NEWSCASTS (*extended)

1000	BBC(am/eu/me)	D	World Briefing*
	BBC(eas)	S	News Summary
		M-F	World Briefing*
		A	News Summary
	R. Australia	D	News
	R. New Zealand Int.	D	News
	VOA News Now	D	News
1030	R. Netherlands	S/A	News
	VOA News Now	D	News Headlines

CURRENT AFFAIRS MAGAZINES/FEATURES

1005	R. Australia	M-F	Asia Pacific
	R. New Zealand Int.	M-F	Late Edition
1015	VOA News Now	M-F	Focus
1030	BBC(am)	S	Agenda (trends)
	R. Netherlands	M-F	Newsline
1033	VOA News Now	M	Press Conference USA
		T	Encounter (debate)
1035	R. Netherlands	S	Wide Angle

BUSINESS/ECONOMICS

1030	BBC(am/eas/me/eu)	M-F	World Business Report
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SCIENCE/TECHNOLOGY (incl. Health & Environment)

1005	R. Australia	S	The Buzz (technology)
1030	BBC(eu)	A	Science in Action

	R. Australia	M	Health Report
		A	In Conversation
1033	VOA News Now	W	Our World

LOCAL LIVES AND VIEWS

1005	R. Australia	A	Pacific Review
1030	BBC(eu)	S	Network Europe
	R. Australia	S	Rural Reporter (the outback)
1035	R. Netherlands	A	Europe Unzipped
	R. New Zealand Int.	S	Sunday Supplement
1055	R. Netherlands	S	Insight

INFORMATIONAL FEATURES

1030	BBC(am/eu)	A	Reporting Religion
	BBC(me)	S/A	World Learning (educational)
	R. Australia	T	Law Report
		W	Religion Report
		A	In Conversation
1033	VOA News Now	S/A/H	On the Line (US foreign policy)

MUSIC

1000	WWCR(5070kHz)	A	The Old Record Shop
1005	BBC(eas)	S	Concert Hall (classical)
		A	Composer of the Month
	R. New Zealand Int.	A	Deep Purple (relaxing)
1030	BBC(eas)	A	Music Review (magazine)

LISTENER CONTACT/INTERACTIVE

1015	WWCR(15685 kHz.)	S	Ask WWCR
1033	VOA News Now	F	Best of Talk to America

SWL, MEDIA AND COMMUNICATIONS

1011	R. New Zealand Int.	S	Mediawatch
1030	R. Australia	H	Media Report

SPORT

1020	BBC(am/eu/me)	S/A	Sports Roundup
1023	VOA News Now	M-F	Sports Report
1030	R. Australia	F	Sports Factor
1045	BBC(am/eas/me/eu)	M-F	Sports Roundup

1100 UTC/ 7am E/4am P - Page 48 Freqs

NEWSCASTS (*extended)

1100	BBC(am/eu)	D	World Briefing*
	BBC(me)	S	World Briefing*
		M-A	News
	BBC(eas)	S/A	World Briefing*
		M-F	News
	R. Australia	D	News
	R. Japan	D	News
	R. New Zealand Int.	D	News
1120	BBC(am/eu)	D	British News
	BBC(me)	S	British News
	BBC(eas)	S/A	British News
1130	R. Korea Int.	D	News

CURRENT AFFAIRS MAGAZINES/FEATURES

1105	BBC(am)	M-F	Caribbean Morning Report*
	R. Australia	S	Correspondents Report
		M-A	Asia Pacific
1115	R. Japan	M-F	Asian Top News (region's radio)
1130	BBC(am/me)	S	Assignment (in-depth)
	BBC(am/eu)	TWFA	Analysis (one issue)
	BBC(eu)	M	Letter from America
		H	From Our Own Correspondent
	BBC(eas)	A	Analysis (one issue)
	R. Sweden	M-F	60 Degrees North
1145	R. Korea Int.	M-F	Seoul Calling

(*special to Caribbean on 6195, 15190 kHz. only.)

BUSINESS/ECONOMICS

1100	R. Netherlands	T	A Good Life (development issues)
1128	HCB	M-F	Money Minute
1130	R. Australia	S	The Business Report
	R. Netherlands	F	A Good Life
1145	R. Sweden	W	Money Matters

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1100	R. Netherlands	H	Research File
1105	BBC(eas)	M	Health Matters
		T	Go Digital (technology)
		W	Discovery (research)
		H	One Planet (ecology)
		F	Science in Action (magazine)
1115	WWCR(15685kHz)	A	Eco Watch
1130	R. Netherlands	M	Research File
1145	R. Sweden	H	Greenscan (ecology-2nd wk.)
			Heartbeat (health-3rd wk.)

Shortwave Guide



ARTS & CULTURE

1100	R. Netherlands	S	Aural Tapestry
1105	BBC(me)	M	Arts in Action (global)
		T	Meridian-Masterpiece (ideas)
		W	Meridian-Screen (cinema)
		H	Meridian-Writing (books)
1130	BBC(eu)	S	Arts in Action
	R. Netherlands	H	Aural Tapestry
	R. Sweden	S	Spectrum (3rd wk.)

LOCAL LIVES AND VIEWS

1100	R. Netherlands	M	Euroquest
		W	Dutch Horizons
		A	Roughly Speaking (Euro youth)
1105	R. New Zealand Int.	S/A	NZ Forces Radio
		M-F	Kim Hill (interviews)
1115	BBC(am)	M-F	Caribbean Magazine*
1130	BBC(am/eu)	M	Letter from America
	R. Netherlands	S	Dutch Horizons
	R. Sweden	A	Weekend (Europe magazine-1st wk.); Sweden Today (2nd wk.); Studio 49 (discussion-4th wk.)
1130	R. Australia	M-F	Bush Telegraph (rural)
1145	R. Sweden	H	Nordic Report (1st wk.); The S-Files (things Swedish-4th wk.)
		F	Review of the Newsweek

(*special to Caribbean on 6195, 15190 kHz. only)

INFORMATIONAL FEATURES

1100	R. Netherlands	F	Documentary
1105	WWCR(5070kHz)	A	This Week in Americana (antiques)
1125	R. Japan	T	Let's Learn Japanese
		H	Brush Up Your Japanese
1130	BBC(eas)	M	Everywoman (magazine)
		T	Omnibus (documentaries)
		H	People and Places
		F	At the Edge of Asia (about S. Korea/Japan)
	R. Netherlands	W	Documentary

MUSIC

1100	HCB	S	Morning Song (hymns)
	WWCR(5070kHz)	S	Ken's Country Classics
1105	BBC(me)	F	The Music Biz (industry)
1110	R. Japan	A	Pop Joins the World
1125	R. Japan	M	Japan Music Log
		W	Japan Musical Treasure Box
		F	Music Beat (pop)
1130	BBC(me)	M	Jazzmatazz
		T	Charlie Gillett (world)
		W	UK Top 20
		H	Revolver (artist selections)
		F	John Peel (eclectic)
	R. Australia	A	Find Music Australia (classical)
	R. Netherlands	T/A	Music 52-15 (international)
	R. New Zealand Int.	F	RNLI Top 5
	R. Sweden	S	Sounds Nordic (rock/pop-exc. 1st wk.)
1140	R. Korea Int.	S	Korean Pop Interactive (requests)

ENTERTAINMENT/DRAMA/VARIETY

1105	BBC(me)	A	Wright Around the World (pop requests)
1130	BBC(eas)	S	Play of the Week (radio theatre)
	HCB	M-F	Morning in the Mountains

SWL, MEDIA AND COMMUNICATIONS

1100	WWCR(15685kHz)	T	World of Radio
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LISTENER CONTACT/INTERACTIVE

1110	R. Japan	S	Hello From Tokyo
1130	R. Sweden	S	In Touch with Stockholm (1st wk.)

SPORT

1105	R. New Zealand Int.	F	Sports Story
1110	BBC(am)	M-F	Caribbean Sport*
1130	BBC(eas)	W	Sports International
1145	BBC(am/eu)	M-H/A	Sports Roundup
	BBC(eas)	A	Sports Roundup
	BBC(am/eu)	F	Football Extra
	BBC(at)	M-H	Sports Roundup
	R. Sweden	M	Sportscan

(*special to Caribbean on 6195, 15190 kHz. only)

	R. Netherlands	S/A	News
	R. New Zealand Int.	M-F	News
1230	HCB	M-F	Latin American & World News

CURRENT EVENTS MAGAZINES/FEATURES

1200	R. Netherlands	M-F	Newsline
	WWCR(12160kHz)	S	Dialogue
1205	BBC(eas)	M-F	Outlook (magazine)
	R. Australia	M-H	Late Night Live (discussion)
	R. New Zealand Int.	M-F	Late Edition
1210	BBC(am)	M-F	Caribbean Morning Report 2*
	R. Canada Int.	M-F	This Morning
1230	BBC(eas)	S	Agenda (trends)
		A	Assignment (in-depth)
	R. Sweden	M-F	60 Degrees North

(*special to Caribbean on 6195, 15190 kHz. only)

BUSINESS/ECONOMICS

1205	BBC(am)	M-F	Caribbean Business*
1245	R. Sweden	W	Money Matters

(*special to Caribbean on 6195, 15190 kHz. only)

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1245	R. Sweden	H	Greenscan (ecology-2nd wk.)
			Heartbeat (3rd wk.)

ARTS & CULTURE

1230	R. Sweden	A	Spectrum (3rd wk.)
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LOCAL LIVES AND VIEWS

1200	R. Korea Int.	T	Korean Kaleidoscope
		A	Figure of the Week
1205	R. Netherlands	A	Europe Unzipped
	R. New Zealand Int.	S/A	NZ Forces Radio
1230	R. Sweden	A	Weekend (Europe magazine-1st wk.); Sweden Today (2nd); Studio 49 (discussion-3rd)
	YLE R. Finland	M-H	Finland This Morning
		F	Capital Cafe (conversations)
		A	Finland This Week
1245	R. Sweden	H	Nordic Report (1st); The S-Files (things Swedish-4th)
		F	Review of the Newsweek

INFORMATIONAL FEATURES

1205	R. Australia	A	The Spirit of Things (spiritual matters)
1220	HCB	M-F	Mission Network News
1230	HCB	A	Adventures in Odyssey (stories)
1245	BBC(eas)	T	Stolen Lives (tragedy's effects)
		H	What's the Problem? (advice)
	YLE R. Finland	A	Starting Finnish (language lesson)

MUSIC

1200	R. Sweden	S	Sounds Nordic (rock-exc. 1st wk.)
1205	R. Australia	S	Nocturne (mostly classical)
		F	Sound Quality (innovative)

ENTERTAINMENT/DRAMA/VARIETY

1200	BBC(eas)	S	Play of the Week (from 1130)
	HCB	M-F	Morning in the Mountains (from 1130)
1205	BBC(eas)	A	Hitch-Hiker's Guide to the Galaxy
1245	BBC(eas)	W/F	Westway (drama serial)

SWL, MEDIA AND COMMUNICATIONS

1200	R. Korea Int.	M	Multiwave Feedback
	WHRI (6040kHz)	A	Dxing with Cumbre
1230	WHRI(15105kHz)	A	Dxing with Cumbre

LISTENER CONTACT/INTERACTIVE

1200	R. Korea Int.	A	From Us to You
1205	R. Netherlands	S	Sincerely Yours
1230	R. Sweden	S	In Touch with Stockholm (1st wk.)
1245	BBC(am)	M	Write On

SPORT

1200	R. Korea Int.	W	Sport
1205	HCB	M-F	Sports News
	R. New Zealand Int.	S	Sportsworld (magazine)
1245	R. Sweden	M	Sportscan

1300 UTC/ 9am E/6am P - Page 49 Freqs

NEWSCASTS (*extended)

1300	BBC(am/me/eu)	D	News
	BBC(eas/est)	D	News
	China R. Int.	D	News
	R. Australia	D	News
	R. Canada Int.	D	News
	R. New Zealand Int.	D	News

CURRENT AFFAIRS MAGAZINES/FEATURES

1305	BBC(am/eu)	M-F	Outlook
	R. Canada Int.	M-F	This Morning (from 1210)
1310	China R. Int.	M-F	Current Affairs
	R. Canada Int.	S	The Sunday Edition (arts/politics/ideas)
1330	R. Sweden	M-F	60 Degrees North

BUSINESS/ECONOMICS

1315	China R. Int.	S	Report on Developing Countries
		A	Biz China
	R. Australia	M-F	Dust and Dollars
1330	China R. Int.	T	Biz China
	BBC(eu)	S	Global Business
1345	R. Sweden	W	Money Matters
1350	BBC(eas)	M-F	World Business Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1305	BBC(me)	M	Science in Action (magazine)
		T	Health Matters
		W	Go Digital (technology)
		H	Discovery (research)
		F	One Planet (ecology)
	R. Australia	A	The Science Show
1345	R. Sweden	H	Greenscan (ecology-2nd wk.)
			Heartbeat (health-3rd wk.)

ARTS & CULTURE

1320	China R. Int.	S	In the Spotlight
1330	R. Sweden	A	Spectrum (3rd Sat.)

LOCAL LIVES AND VIEWS

1310	R. Canada Int.	A	The House (Canadian politics)
1330	BBC(am)	S	In Praise of God (worship service)
	BBC(me)	A	People & Politics (Parliament)
	China R. Int.	M	People in the Know
		W	China Horizons
		F	Life in China
	R. Sweden	A	Weekend (Europe magazine-1st wk.); Sweden Today (2nd wk.); Studio 49 (discussion-4th wk.)
1345	R. Sweden	H	Nordic Report (1st wk.); The S-Files (things Swedish-4th wk.)
		F	Review of the Newsweek

INFORMATIONAL FEATURES

1330	BBC(me)	S	Reporting Religion
		M	At the Edge of Asia (about S. Korea/Japan)
		T	Everywoman (magazine)
		W	Omnibus (documentaries)
		F	People and Places
	China R. Int.	H	Voices from Other Lands
	HCB	M-F	Family Life Today
1345	BBC(eu)	T	Stolen Lives (tragedy's effects)
		H	What's the Problem? (advice)

MUSIC

1305	BBC(am)	S	Composer of the Month
	BBC(me)	A	Composer of the Month
	R. Australia	S	Nocturne (from 1205)
1320	R. Australia	M-F	The Planet (international)
1330	BBC(am)	A	The Music Feature
	R. Sweden	S	Sounds Nordic (rock/pop-exc. 1st wk.)
	WWCR(15685kHz)	A	The Old Record Shop

ENTERTAINMENT/DRAMA/VARIETY

1300	Channel Africa	S/A	Channel Africa Extra (weekend variety)
	HCB	S	Weekend Magazine
1305	BBC(eu)	S	Hitch-Hiker's Guide to the Galaxy
		A	Wright Around the World (requests)
1330	BBC(me)	S	Pick of the World (BBC's best)
1345	BBC(am)	M-F	Off the Shelf (book readings)
	BBC(eu)	W/F	Westway (drama serial)

LISTENER CONTACT/INTERACTIVE

1315	WWCR(15685kHz)	A	Ask WWCR
1320	China R. Int.	A	Listeners' Garden
1330	R. Sweden	S	In Touch with Stockholm (1st wk.)
1345	BBC(eu)	M	Write On

SPORT

1305	BBC(am)	A	World Football (magazine)
1310	R. Australia	M-F	Sport (daily report)
1330	BBC(me)	H	Sports International (magazine)
1345	R. Sweden	M	Sportscan

1400 UTC/ 10am E/7am P - Page 49 Freqs

NEWSCASTS (*extended)

1400	BBC(am/eu)	D	News
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NEWSCASTS (*extended)

1200	BBC(am/me/eu)	D	News
	BBC(eas)	M-A	News
	HCB	M-F	Latin American & World News
	R. Australia	D	News
	R. Canada Int.	M-F	News

Shortwave Guide



BBC(me/esaf/eas) S/A News
 BBC(me/esaf) M-F World Briefing*
 China R. Int. D News
 R. Australia D News
 R. Canada Int. D News
 R. Japan D News
 1430 BBC(me/esaf/eas) M-F British News
 R. Netherlands S/A News

CURRENT AFFAIRS MAGAZINES/FEATURES

1400 BBC(eas) M-F East Asia Today
 1405 R. Canada Int. S The Sunday Edition (from 1310)
 M-F This Morning (from 1210)
 1410 China R. Int. M-F Current Affairs
 1415 R. Japan M-F 44 Minutes
 1430 R. Netherlands M-F Newslines

BUSINESS/ECONOMICS

1415 China R. Int. S Report on Developing Countries
 1420 BBC(me/esaf) M-F World Business Report
 1430 China R. Int. T Biz China

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1405 BBC(eu) M Science in Action (magazine)
 T Health Matters
 W Go Digital (technology)
 H Discovery (research)
 F One Planet (ecology)

ARTS & CULTURE

1405 BBC(am) M Meridian-Masterpiece (ideas)
 T Meridian-Screen (cinema)
 W Meridian-Writing (books)
 F Arts in Action (global)
 R. Australia S Books and Writing
 1420 China R. Int. S In the Spotlight

LOCAL LIVES AND VIEWS

1410 R. Japan S Weekend Square
 1430 China R. Int. M People in the Know
 W China Horizons
 F Life in China
 R. Canada Int. F C'est La Vie (life in Quebec)
 1436 R. Netherlands A Europe Unzipped
 1445 R. Canada Int. M-H Out Front (personally produced radio)
 1455 R. Netherlands A Insight

INFORMATIONAL FEATURES

1405 R. Australia A New Dimensions ("progressive" ideas)
 1430 BBC(eu) M At the Edge of Asia (about S. Korea/Japan)
 T Everywoman (magazine)
 W Omnibus (documentaries)
 F People and Places
 China R. Int. H Voices from Other Lands

MUSIC

1405 BBC(am) H The Music Biz (industry)
 R. Australia M-F The Planet (from 1315)
 R. Japan S Pop Joins the World
 1430 BBC(am) M Charlie Gillett (world)
 T UK Top 20 (pop/rock)
 W Revolver (artist selection)
 H John Peel (eclectic)
 F Jazzmatazz

ENTERTAINMENT/DRAMA/VARIETY

1400 Channel Africa S/A Channel Africa Extra (from 1300)
 1405 R. Canada Int. A Vinyl Cafe (humor)

LISTENER CONTACT/INTERACTIVE

1405 BBC S Talking Point (current events call-in)[live]
 1420 China R. Int. A Listeners' Garden
 1438 R. Netherlands S Sincerely Yours

SPORT

1405 BBC A Sportsworld (live action)
 1430 BBC(eu) H Sports International
 1445 BBC(me/esaf/eas) M-H Sports Roundup
 F Football Extra

1500 UTC/ 11am E/8am P - Page 50 Freqs

NEWSCASTS (*extended)

1500 BBC(am/me/at/eas) D News
 BBC(eu) S/A News
 M-F World Briefing*
 China R. Int. D News
 R. Australia D News

R. Canada Int. S/A News
 1530 BBC(eu) M-F British News

CURRENT EVENTS MAGAZINES/FEATURES

1505 BBC(me) M-F Outlook (topical magazine)
 BBC(at) M-F Focus on Africa
 R. Australia M-F Asia Pacific
 R. Canada Int. S The Sunday Edition (from 1310)
 China R. Int. M-F Current Affairs
 1530 R. Austria Int. D Report from Austria
 1545 BBC(eu) MTHF Analysis
 W From Our Own Correspondent

BUSINESS/FINANCE

1500 R. Netherlands F A Good Life
 1515 China R. Int. S Report on Developing Countries
 1530 China R. Int. T Biz China
 R. Netherlands T A Good Life (development issues)

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1500 R. Netherlands M Research File
 1505 BBC(am) M One Planet (ecology)
 T Science in Action (magazine)
 W Health Matters
 H Go Digital (technology)
 F Discovery (research)
 R. Canada Int. A Quirks and Quarks
 1530 R. Australia M The Health Report
 R. Netherlands H Research File

ARTS & CULTURE

1500 R. Netherlands H Aural Tapestry
 1505 BBC(eas) M Meridian-Masterpiece (ideas)
 T Meridian-Screen (cinema)
 H Meridian-Writing (books)
 F Arts in Action (global)
 1520 China R. Int. S In the Spotlight
 1530 R. Netherlands S Aural Tapestry

LOCAL LIVES AND VIEWS

1500 R. Netherlands S Dutch Horizons
 1530 China R. Int. M People in the Know
 W China Horizons
 F Life in China
 R. Netherlands M Europaquest
 W Dutch Horizons
 A Roughly Speaking (Euro youth)
 1535 R. Austria Int. S Network Europe
 A Insight Central Europe

INFORMATIONAL FEATURES

1500 R. Netherlands W Documentary
 1505 R. Australia S Encounter (spiritual beliefs)
 1530 BBC(am) M People and Places
 T At the Edge of Asia (about S. Korea/Japan)
 W Everywoman (magazine)
 H Omnibus (documentaries)
 BBC(at) T Stolen Lives (tragedy's effects)
 H What's the Problem? (advice)
 China R. Int. H Voices from Other Lands
 R. Australia T The Low Report
 W The Religion Report
 R. Netherlands F Documentary
 1545 BBC(me) T Stolen Lives (tragedy's effects)
 H What's the Problem? (advice)

MUSIC

1500 R. Netherlands T/A Music 52-15 (international)
 1505 BBC(am/eu/me) S Concert Hall
 BBC(eas/esaf) S Composer of the Month
 BBC(eas) H The Music Biz (industry)
 R. Australia A Nocturne (mostly classical)
 1530 BBC(eas) M Charlie Gillett (world)
 T UK Top 20
 W Revolver (artist selection)
 H John Peel (eclectic)
 F Jazzmatazz

ENTERTAINMENT/DRAMA/VARIETY

1505 BBC(wcaf) S Play of the Week (radio theatre)
 1530 BBC(esaf) S Pick of the World (BBC's best)
 BBC(at) W/F Westway (drama serial)
 1545 BBC(me) W/F Westway (drama serial)
 BBC(at) M-F Off the Shelf (readings)

SWL, MEDIA AND COMMUNICATIONS

1530 R. Australia H The Media Report

LISTENER CONTACT/INTERACTIVE

1520 China R. Int. A Listeners' Garden

1530 BBC(at) M Write On
 1545 BBC(me) M Write On
 1550 R. Austria Int. A Listeners' Letters

SPORT

1505 BBC(am) F Sports International (magazine)
 BBC A Sportsworld (from 1405)
 1530 R. Australia F The Sports Factor

1600 UTC/ 12pm E/9am P - Page 50 Freqs

NEWSCASTS (*extended)

1600 BBC(am/eu) S/A News
 BBC(me/at/sas) D News
 R. Australia D News
 R. Netherlands S/A News

CURRENT EVENTS MAGAZINES/FEATURES

1600 BBC(am/eu) M-F Europe Today
 R. Netherlands M-F Newslines
 1608 R. Netherlands S Wide Angle

BUSINESS/FINANCE

1630 BBC(am/eu) M-F World Business Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1605 BBC(sas) M Health Matters
 T Go Digital (technology)
 W Discovery (research)
 H One Planet (ecology)
 F Science in Action (magazine)

ARTS & CULTURE

1605 BBC(me/at) M Meridian-Masterpiece (ideas)
 T Meridian-Screen (cinema)
 W Meridian-Writing (books)
 F Arts in Action (global)
 1630 BBC(at) H Artbeat

LOCAL LIVES AND VIEWS

1605 R. Australia S The National Interest
 T The Comfort Zone (homes/gardens/food)
 W Verbatim (oral histories)
 H Hindsight (history)
 F Away! (Aboriginal culture)
 1606 R. Netherlands A Europe Unzipped
 1630 BBC(at) W Talkabout Africa
 H Performance Plus (discussion)
 R. Australia W Earshot (Australian voices)

INFORMATIONAL FEATURES

1605 BBC(at) F Omnibus (documentary)
 1630 BBC(sas) M Everywoman (magazine)
 T Omnibus (documentaries)
 H People and Places
 F At the Edge of Asia (about S. Korea/Japan)

MUSIC

1600 WWCR(15685kHz) M-F World Wide Country Radio
 1605 BBC(me/at) H The Music Biz (industry)
 R. Australia A Nocturne (from 1505)
 1630 BBC(me) M Charlie Gillett (world)
 T UK Top 20 (pop/rock)
 W Revolver (artist selections)
 H John Peel (eclectic)
 F Jazzmatazz

ENTERTAINMENT/DRAMA/VARIETY

1605 R. Australia M Margaret Throsby Interview
 1630 BBC(me) W/F Westway (drama serial)
 BBC(at) T African Performance (plays)

SPORT

1605 BBC S Sunday Sportsworld
 A Sportsworld (from 1405)
 1630 BBC(sas) W Sports International (magazine)
 BBC(at) M/F Fast Track
 1645 BBC(am/eu) M-F Sports Roundup

2100 UTC/ 5pm E/2pm P - Page 53 Freqs

NEWSCASTS

2100 BBC(am/wcaf/eu) D News
 R. Australia D News
 2120 BBC(am/eu) M-A British News

CURRENT EVENTS MAGAZINES/FEATURES

2110 R. Australia S-H AM (morning news magazine)
 2130 BBC(eu) A Assignment (in-depth)

Shortwave Guide



2145 BBC(am) MTHF Analysis
W From Our Own Correspondent

BUSINESS/FINANCE

2105 BBC(am) S Global Business
A World Business Review
BBC(am/au) M-F World Business Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)

2105 BBC(wcaf) M Health Matters
T Go Digital (technology)
W Discovery (research)
H One Planet (ecology)
F Science in Action (magazine)
2130 R. Australia M Health Report
T Innovations

LOCAL LIVES AND VIEWS

2105 R. Australia A Australia All Over
2115 BBC(am) M-F Caribbean Report*
2130 BBC(am) T/F Calling the Falklands ^
BBC(wcaf) A People and Politics
R. Australia H Rural Reporter
2145 BBC(am) A Letter from America
(*special service on 5975, 11675, 15390 kHz. only.)
(^special service on 11720 kHz.)

INFORMATIONAL FEATURES

2130 BBC(wcaf) M Everywoman (magazine)
T Omnibus (documentaries)
H People and Places
F At the Edge of Asia (about S. Korea/Japan)
R. Australia S Time to Talk (Pacific island nations)
W Religion Report
2145 BBC(am) A Patterns of Faith

MUSIC

2100 WBCQ(7415kHz) S Radio Free Euphoria
A HarvZower
2105 BBC(eu) A Composer of the Month
2130 BBC(wcaf) A Composer of the Month
R. Australia F Oz Sounds
WBCQ(7415kHz) F Pab Sungenis Project (obscure oldies)

ENTERTAINMENT/DRAMA/VARIETY

2100 WBCQ(7415kHz) M Jean Shepherd (humor)
F Juliet's Wild Kingdom
2105 BBC(wcaf) S Wright Around the World (requests)
BBC(eu) S Pick of the World (BBC's best)
2130 BBC(eu) S Hitch-Hiker's Guide to the Galaxy
BBC(wcaf) W Pick of the World (BBC's best)
2145 BBC(eu) M-F Off the Shelf (readings)

SWL, MEDIA AND COMMUNICATIONS

2100 WHRI(5745kHz) S DXing with Cumbre

LISTENER CONTACT/INTERACTIVE

2105 R. Australia F Feedback
2145 BBC(am) S Write On

SPORT

2130 BBC(wcaf) W Sports International
BBC(am) D Sports Roundup
BBC(eu) M-F Sports Roundup

2200 UTC/ 6pm E/3pm P - Page 54 Freqs

NEWSCASTS (*extended)

2200 BBC(am/au) D The World Today*
BBC(wcaf) D News
R. Australia D News
R. Canada Int. M-F World at Six*
2230 R. Prague D News
R. Vlaanderen Int. M-F News

CURRENT EVENTS MAGAZINES/FEATURES

2200 R. Canada Int. S/A The World This Weekend
2205 BBC(wcaf) M-F Outlook (topical magazine)
R. Australia A Correspondents Report
2210 R. Australia S-H AM (morning news magazine)
F Asia Pacific
A Correspondents' Report
2230 BBC(am) S Agenda (trends)
BBC(wcaf) S Assignment (in-depth)
BBC(am/wcaf/au) A From Our Own Correspondent
R. Australia A AM Saturday
R. Canada Int. M-F As It Happens (interviews)
2243 R. Vlaanderen Int. M Focus on Europe
2248 R. Vlaanderen Int. H International Report

BUSINESS/FINANCE

2230 R. Australia A The Business Report
2240 R. Prague H Economic Report
2243 R. Vlaanderen Int. H Economics

SCIENCE/TECHNOLOGY (incl. Health & Environment)

2243 R. Vlaanderen Int. T Green Society (ecology)

ARTS & CULTURE

2235 R. Prague A Readings from Czech Literature
2240 R. Prague S The Arts
2243 R. Vlaanderen Int. W/F Around the Arts

LOCAL LIVES AND VIEWS

2230 BBC(am/au) F People and Politics
2234 R. Vlaanderen Int. M-F Belgium Today
2235 R. Prague S Letter from Prague
M-F News View
2238 R. Vlaanderen Int. S Tourism in Flanders
2245 R. Prague M One on One (interview)
T Talking Point or Insight Central Europe
2248 R. Vlaanderen Int. W Around Town
F Tourism in Flanders

INFORMATIONAL FEATURES

2245 BBC(wcaf) T Stolen Lives (tragedy's effects)
H What's the Problem? (advice)

MUSIC

2200 WBCQ(7415kHz) F Pab Sungenis (from 2130)
A Radio Timtrun Worldwide
2230 R. Vlaanderen Int. A Music from Flanders
2240 R. Australia S Australian Music Show (rock)
M Music Deli (international)
T Blacktracker (Aboriginal contemporary)
W Australian Country Style
H Jazz Notes
2240 R. Prague A Saturday Music (classical/folk/jazz)
2254 R. Vlaanderen Int. S-F Soundbox

ENTERTAINMENT/DRAMA/VARIETY

2205 BBC(wcaf) S Hitch-Hiker's Guide to the Galaxy
A Pick of the World (BBC's best)
2230 R. Canada Int. A Madly Off in All Directions (comedy)
WBCQ(7415kHz) F Wonton Display of Control & Disruption (satire)
2245 BBC(wcaf) W/F Westway (drama serial)

SWL, MEDIA AND COMMUNICATIONS

2230 R. Vlaanderen Int. S Radio World
WHRI(9495kHz) A DXing with Cumbre

LISTENER CONTACT/INTERACTIVE

2244 R. Vlaanderen Int. S Brussels 1043
2245 BBC(wcaf) M Write On
R. Prague S Mailbox

SPORT

2230 R. Canada Int. S Inside Track (anthologies)
2248 R. Vlaanderen Int. M Sports

2300 UTC/ 7pm E/4pm P - Page 54 Freqs

NEWSCASTS (*extended)

2300 BBC(am) S The World Today*
M-F News
A News Summary
BBC(eas) D The World Today
China R. Int. D News
R. Australia D News
R. Canada Int. D News
2330 R. Netherlands S/A News

CURRENT EVENTS MAGAZINES/FEATURES

2305 BBC(am) M-F Outlook
R. Canada Int. M-F As It Happens (from 2230)
2310 China R. Int. S-H Current Affairs
R. Australia S-H Asia Pacific
2330 R. Canada Int. W Dispatches (international)
R. Netherlands M-F Newline
2355 R. Netherlands F Insight (commentary)

BUSINESS/ECONOMICS

2315 China R. Int. A Report on Developing Countries
2330 China R. Int. M Biz China

SCIENCE/TECHNOLOGY (incl. Health & Environment)

2305 R. Australia A All in the Mind (the human brain)
R. Canada Int. A Quirks and Quarks

2330 R. Australia S Earthbeat (ecology)
M The Buzz (technology)
A Innovations
BBC(eas) F Global Business

ARTS & CULTURE

2320 China R. Int. A In the Spotlight
2330 R. Australia T Arts with Julie Copeland

LOCAL LIVES AND VIEWS

2330 China R. Int. S People in the Know
T China Horizons
H Life in China
W Rural Reporter (outback)
2335 R. Netherlands A Europe Unzipped

INFORMATIONAL FEATURES

2305 R. Australia F Lingua Franca (about language)
2330 China R. Int. W Voices from Other Lands
2345 BBC(am) T Stolen Lives (tragedy's effects)
H What's the Problem? (advice)

MUSIC

2300 WBCQ(7415kHz) H Goddess Irena I Music Show
F The Lost Discs Radio Show
2305 R. Canada Int. S Global Village (world/folk)
2330 WBCQ(7415kHz) A Fred Flintstone's Music Show

ENTERTAINMENT/DRAMA/VARIETY

2300 WBCQ(7415kHz) S Le Show with Harry Shearer
2301 BBC(am) A Play of the Week (radio theatre)
2305 WBCQ(5070kHz) W/F Golden Age of Radio Theatre
2320 R. Australia F Short Story
2330 BBC(am) S Pick of the World (BBC's best)
BBC(eas) A Pick of the World (BBC's best)
2345 BBC(am) W/F Westway (drama serial)

SWL, MEDIA AND COMMUNICATIONS

2300 WBCQ97415kHz) A The Real Amateur Radio Show
2330 R. Australia H The Media Report
WBCQ(7415kHz) W World of Radio

LISTENER CONTACT/INTERACTIVE

2320 China R. Int. F Listeners' Garden
2335 R. Netherlands S Sincerely Yours
2345 BBC(am) M Write On

SPORT

2330 R. Australia F The Sports Factor

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

Harold Frodge, Midland, MI; Alokesh Gupta, New Delhi, India; Glenn Hauser, Enid, OK; Adrian Sainsbury, Radio New Zealand Intl; Harold Sellers, Robert E. Thomas, II, Bridgeport, CT; Larry Van Horn, Brasstown, NC; *BBC On Air*; *BCL News*; *BCDXC*; *Cumbre DX*; *DXA*; *DX Listening Digest*; *DX Ontario*; *Fineware*; *Hard Core DX*; *HFCC*; *ILG*; *NASWA*; *World of Radio*; *Worldwide DX Club*.

A Rising Star: Fengyun-1D

While waiting for the launch of NOAA-M on June 24, reports came via the Internet of the first transmissions on 180 MHz from the new Chinese weather satellite Fengyun-1D. Although the launch had been scheduled for “spring 2002,” this was vague enough for me to have forgotten about it. Bob Christy’s announcement that he had heard the beacon prompted me to start monitoring for a WXSAT transmission in the 1700 MHz band.

Fengyun-1C has been providing high resolution picture transmission (HRPT) images for some years, though it differs from NOAA WXSATs in providing a total of ten channels of data. Dr T S Kelso provides a web site from which Kepler elements from a variety of satellite types can be collected for satellite tracking purposes, so I looked at the “Last 30 Days” launch section. Fengyun-1D was included, so I downloaded the file and updated my HRPT tracking program software.

<http://www.celestrak.com/NORAD/elements/>

The first pass over Britain was the following morning, so I had several hours to wait. There was no certainty that the elements would be accurate enough to track a satellite launched only hours earlier, and in any case the onboard equipment might not even be switched on. To my surprise, it was – and I received a good pass despite the fairly low elevation that took it just over roof-tops and trees. I e-mailed the WXSAT lists to confirm reception, and left the equipment on automatic during my absence that morning. On my return, I found a superb pass recorded during the following orbit.

Fengyun-1D was launched with a companion satellite, and as the two separated, an ambiguity arose concerning which satellite was which! A day or two later this was resolved and Kepler elements were then labeled “payload B.” The signal appears to be of greater strength than that from Fengyun-1C. We shall see whether the older satellite is switched off later, or not. Fengyun-1D’s sun-synchronous orbit brings it over localities southbound during mid-morning (about an hour later than NOAA-15), and northbound during mid-evening.

The following table, provided by Mike Kenny, reviews the ten image data

channels transmitted by FY-1D (and -C). In practice, the difference between the “visible” channels is not large. During the early orbit phase, the infrared channels are not switched on because the system – especially the optics – has to outgas. The forced cooling of the infrared sensors and their surroundings would cause any gaseous or other impurities to freeze on the cold surfaces, so several days of outgassing are required.

Chan	Wavelength	Primary use
1	0.58-0.68	Daytime cloud, ice and snow, vegetation
2	0.84-0.89	Daytime cloud, vegetation, WV calibration
3	3.55-3.95	Night cloud
4	10.3-11.3	SST, day/night cloud
5	11.5-12.5	SST, day/night cloud
6	1.58-1.64	Soil humidity, ice/snow separation
7	0.43-0.48	Ocean color
8	0.48-0.53	Ocean color
9	0.53-0.58	Ocean color
10	0.90-0.985	Water vapor

NOAA-M remains on schedule for launch on June 24 – just days after this deadline – so hopefully we shall have both APT (automatic picture transmission) and HRPT transmissions from late June onwards.

HRPT frequencies:

NOAA-12 1698.0 MHz
NOAA-14 1707.0 MHz
NOAA-15 1702.5 MHz
NOAA-16 1698.0 MHz
NOAA-17 ?
Fengyun-1C 1700.4 MHz
Fengyun-1D 1700.4 MHz

Note that FY-1C and FY-1D are normally found transmitting HRPT on 1704.5 MHz, despite the “official” frequencies.

On the geostationary scene, GOES-9 will be readied to back up the Geostationary Meteorological Satellite-5 (GMS-5), operated by the Japan Meteorological Agency. GMS-5, launched in 1995, is past its useful life and is encountering imaging problems and fuel shortages. GOES-9, also launched in 1995 and currently in storage mode, does not meet U.S. weather forecasting requirements, but does have sounding and limited imaging capabilities that

will supply data comparable to that of the GMS-5. Japan’s Multifunctional Transportation Satellite (MTSAT)-1 was planned as a replacement for GMS-5, but experienced a launch failure in 1999. The replacement follow-on, MTSAT-1R, is currently planned for launch in the summer of 2003.

Color?

Some readers have asked about the possible reproduction of color images in this column. Although the original images are received in black-and-white, most WXSAT processing programs are able to add convincing simulated color. Any pictures supplied to this column in color will be reproduced in color in the electronic version of *Monitoring Times* called *MT Express*. However, the editor informs me there is little likelihood of color appearing throughout the printed version due to the price of coated paper stock and related expenses.

Other Frequencies

NOAA-14 transmits APT on 137.62 MHz
NOAA-12 and -15 transmit APT on 137.50 MHz
NOAA-M (-17) should transmit APT on 137.50 MHz
Meteor 3-5 may transmit APT on 137.30 MHz when in sunlight
Meteor 2-21 may transmit APT on 137.85 MHz when Meteor 3-5 is off.
GOES-8 and GOES-10 use 1691 MHz for WEFAX

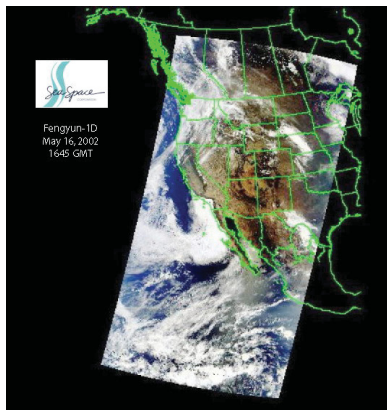


Fig 1: FY-1D image received at SeaSpace Corp. on May 16, 2002 at 1645 UT located near San Diego CA.

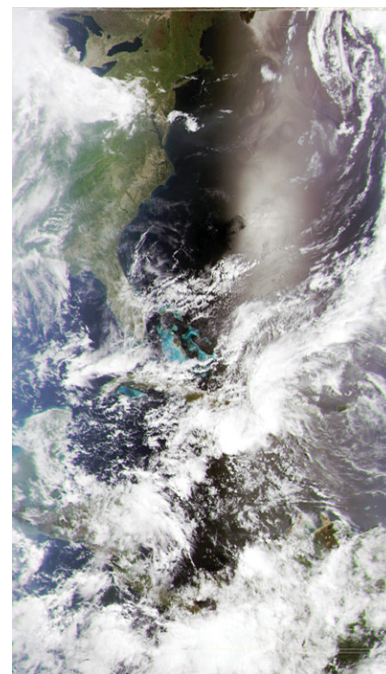


Fig 2: FY-1D image received on May 25, 2002 at 1405 UTC by Joseph Gresham

Satellite Service Guide



Robert Smathers
roberts@nmia.com
www.monitoringtimes.com/mtssg.html

All Frequencies MHz

SES Americom Americom-2

C-Band - 85 degrees West longitude

1(V)	3720	Occasional video
2(H)	3740	Occasional video
3(V)	3760	Occasional video / RAI International (occ)
4(H)	3780	Data Transmissions
5(V)	3800	NASA Contract Channel
6(H)	3820	Occasional video
7(V)	3840	Horse Racing - digital (occ)
8(H)	3860	Data Transmissions
9(V)	3880	NASA Television
10(H)	3900	Data Transmissions
11(V)	3920	Horse Racing - digital (occ) / Occasional video
12(H)	3940	Data Transmissions
13(V)	3960	Data Transmissions / SCPC Service
1179.40 NASA Space Shuttle audio (missions only) and International Space Station communications		
14(H)	3980	Data Transmissions
15(V)	4000	Pennsylvania Cable Network (digital)
16(H)	4020	Data Transmissions
17(V)	4040	Data Transmissions
18(H)	4060	Data Transmissions
19(V)	4080	Data Transmissions
20(H)	4100	Data Transmissions
21(V)	4120	Horse Racing - digital (occ)
22(H)	4140	USIA Worldnet and VOA Radio (digital)
23(V)	4160	Horse Racing - digital (occ)
24(H)	4180	Horse Racing - digital (occ) / Data Transmissions

SES Americom Americom-2

Ku-Band - 85 degrees West longitude

1(V)	11720	Occasional video
2(H)	11740	NBC SNG feeds (digital)
3(V)	11760	Occasional video
4(H)	11780	NBC SNG feeds (digital)
5(V)	11800	Occasional video
6(H)	11820	Occasional video
7(V)	11840	Action Sports Cable Network (digital)
8(H)	11860	NBC SNG feeds (digital)
9(V)	11880	Occasional video
10(H)	11900	Occasional video
11(V)	11920	Occasional video
12(H)	11940	Occasional video
13(V)	11960	Occasional video
14(H)	11980	Occasional video
15(V)	12000	Occasional video
16(H)	12020	Occasional video
17(V)	12040	Data Transmissions
18(H)	12060	Occasional video
19(V)	12080	Occasional video
20(H)	12100	Occasional video
21(V)	12120	Occasional video
22(H)	12140	Occasional video
23(V)	12160	Occasional video
24(H)	12180	Occasional video

SES Americom Americom-3

C-band - 87 degrees West longitude

1(H)	3720	Data Transmissions / Associated Press TV (digital)
2(V)	3740	Data Transmissions
3(H)	3760	WSBK-TV Boston, MA (digital)
4(V)	3780	Data Transmissions / Urban American TV (digital) / Hispanic TV Network (digital)
5(H)	3800	Occasional video
6(V)	3820	Fox Sports North - Minnesota and Wisconsin (digital) / Comcast SportsNet Mid-Atlantic (digital)

7(H)	3840	SuperCanal (digital)
8(V)	3860	WNBC-TV New York City - Primetime 24 NBC affiliate (VC2+)
9(H)	3880	WPIX-TV New York City, WB affiliate (VC2+) 6.80 Talk America Radio Network
10(V)	3900	WKRN-TV Nashville, TN - Primetime 24 ABC affiliate (VC2+)
11(H)	3920	(none)
12(V)	3940	WSEE-TV Erie, PA - Primetime 24 CBS affiliate (VC2+)
13(H)	3960	Occasional video
14(V)	3980	Turner Classic Movies (VC2+)
15(H)	4000	KTLA-TV Los Angeles, CA - WB affiliate (VC2+)
16(V)	4020	CNN fn (VC2+)
17(H)	4040	Data Transmissions / Christian Radio Coalition (digital)
18(V)	4060	Fox Movie Channel (VC2+) 6.80 Premiere Radio Networks Channel
19(H)	4080	1 (none)
20(V)	4100	University Network - Dr. Gene Scott
21(H)	4120	CNN feeds (occ)
22(V)	4140	ZNS-13 Bahamas (digital) / Miami TV stations (digital)
23(H)	4160	Data Transmissions
24(V)	4180	America One Television Network

SES Americom Americom-3

Ku-Band - 87 degrees West longitude

1(H)	11720	Data Transmissions / STARS of Faith Network (digital)
2(V)	11740	(none)
3(H)	11760	Data Transmissions
4(V)	11780	Data Transmissions
5(H)	11800	Data Transmissions
6(V)	11820	Occasional video
7(H)	11840	Data Transmissions
8(V)	11860	Occasional video
9(H)	11880	Occasional video
10(V)	11900	National Technology University (digital)
11(H)	11920	Data Transmissions
12(V)	11940	Occasional video
13(H)	11960	CNN Newsource (digital)
14(V)	11980	Data Transmissions
15(H)	12000	Occasional video
16(V)	12020	Occasional video
17(H)	12040	Occasional video
18(V)	12060	Occasional video
19(H)	12080	Occasional video
20(V)	12100	PBS Kids and PBS You (digital)
21(H)	12120	PBS Kids and PBS You (digital) / PBS HDTV (digital)
22(V)	12140	Indiana Higher Educational Telecommunications Service (digital)
23(H)	12160	PBS feeds (digital) / Annenberg Channel (digital)
24(V)	12180	PBS feeds (digital)

Loral Skynet Telstar 4

C-Band - 89 degrees West longitude

1(V)	3720	X3 - X Cubed Network (VC2+)
2(H)	3740	Data Transmissions
3(V)	3760	(none)
4(H)	3780	Extasy Television (VC2+)
5(V)	3800	True Blue (VC2+)
6(H)	3820	Occasional video
7(V)	3840	The Erotic Networks (TEN) Promo Channel
8(H)	3860	Fresh Television (VC2+)
9(V)	3880	Occasional video
10(H)	3900	Occasional video

11(V)	3920	Occasional video
12(H)	3940	ABC feeds (occ)
13(V)	3960	CBS backup (digital)
14(H)	3980	ABC feeds (occ) / ABC HDTV (digital)
15(V)	4000	(none)
16(H)	4020	Occasional video
17(V)	4040	Occasional video
18(H)	4060	PBS Schedule X
19(V)	4080	Occasional video
20(H)	4100	Occasional video
21(V)	4120	ABC feeds - West (LEITCH)
22(H)	4140	ABC feeds - East (LEITCH)
23(V)	4160	Occasional video
24(H)	4180	Occasional video

Loral Skynet Telstar 4

Ku-Band - 89 degrees West longitude

T01(V)	11730	South Carolina Educational Television (digital) / South Carolina Educational Radio (digital)
T02(H)	11743	Data Transmissions
T03(V)	11790	Microspace Velocity transmissions (digital)
T04(H)	11803	Data Transmissions
T05(V)	11850	Data Transmissions
T06(H)	11863	Georgia Public Television (digital)
T07(V)	11910	Data Transmissions
T08(H)	11923	Data Transmissions
T09(V)	11971	ABC SNG feeds (analog/digital)
T10(H)	11984	Occasional video
T11(V)	12033	Occasional video
T12(H)	12046	ABC SNG feeds (analog/digital)
T13(V)	12095	Florida educational feeds (digital)
T14(H)	12108	Louisiana Public Broadcasting (digital)
T15(V)	12157	Muslim TV Ahmadiyya (digital) / DMX for Business (digital)
T16(H)	12170	Occasional video

Panamsat Galaxy 11

C-Band - 91 degrees West longitude

1(H)	3720	WB 100+ Station feed (digital)
2(V)	3740	Fox Cable Networks (digital)
3(H)	3760	Black Entertainment TV and BET on Jazz (digital)
4(V)	3780	Fox Cable Networks (digital)
5(H)	3800	Fox Cable Networks (digital)
6(V)	3820	Game Show Network (VC2+) 7.30 Cable Radio Network 1
7(H)	3840	The Golf Channel (VC2+)
8(V)	3860	Occasional video
9(H)	3880	Access Television / Bloomberg Television (digital)
10(V)	3900	Shop at Home Network (analog and digital)
11(H)	3920	Eternal Word Television Network (digital)
12(V)	3940	WE: Women's Entertainment TV (VC2+)
13(H)	3960	Ovation TV / National Urban Entertainment TV / Oxygen TV (digital)
14(V)	3980	Independent Film Channel (VC2+) 7.38 RAI Satelradio Italy
15(H)	4000	Major Broadcasting Cable (MBC) (digital) / The Word Network (digital)
16(V)	4020	ABC Family - West (VC2+)
17(H)	4040	Occasional video
18(V)	4060	Fox News Channel (VC2+)
19(H)	4080	America's Collectibles Network (digital) / KLUZ-TV Albuquerque - Univision (digital) / TCT Ministries (digital) / KJLA-TV Los Angeles (digital)
20(V)	4100	Occasional video
21(H)	4120	Occasional video
22(V)	4140	Fox Cable Networks (digital)
23(H)	4160	Fox Cable Networks (digital)
24(V)	4180	International Channel (digital)

The Fed Files Mailbag

From time to time we dip into the *Fed Files* mailbag and see what our readers have been hearing. This month we have quite a few interesting tidbits to share with the readers.

First, Mike Gakinski from **Cleveland, Ohio**, checks in with the following active frequencies from his area.

166.375 Cuyahoga Valley National Park Police (Rangers)
172.325 FBI Repeater
415.200 General Services Administration

♦ FAA Repeater Pairs and More

Another one of our faithful readers, Ed Bryant, N4UMJ passes along the following list of confirmed **Federal Aviation Administration** frequency pairs.

F1 172.925/169.325 (172.150 repeater input in central region locations, 172.175 in western region locations)
F2 172.950/169.350 (172.150 repeater input in western region/central region/Great Lakes locations)
F3 172.975/169.375 (172.125 repeater input in western/central region locations)
F4 172.850/169.250
F5 172.875/169.275
F6 172.900/169.300
F7 172.825/169.225

Ed notes, "This leaves out the channels F8 through F10 (as indicated in *Police Call*). I suspect the 3.6 MHz offset could be applied to them to determine their input as well."

I should point out that the system above is reportedly a 12 channel system shared by several different FAA offices. The **channels F8-12** are set up as indicated below. Various offices seem to have their own setup for their 12 channel systems. Reports from the monitors in the field are requested.

F8 172.125 NARACS ATC/Flight Standards (AFS) simplex net
F9 172.150 FAA Security and air security simplex (some repeaters in select locations) net — Nationwide, NARACS AFS simplex net (PL tones 136.5- 4Z/146.2-4B/156.7-5A), Washington DC maintenance simplex net, Southern region maintenance simplex net, and telemetry/control data in selected locations.
F10 172.175 NARACS AFS Admin (PL tone 136.5-4Z) and Maintenance simplex net — Nationwide, telemetry/control data in selected locations
F11 166.175 This is the main FAA nationwide simplex. Also used by the NTSB at crash sites.

F12 172.125 Maintenance simplex net

Miscellaneous VHF FAA frequencies

selected from the *MT Fed Files*:

162.050 Southern Region Maintenance Net (Florida)
162.200 Telemetry channel (Wind shear alert systems, NavAid controls, etc)
162.250 Telemetry channel (Wind shear alert systems, NavAid controls, etc), Administration/Maintenance Nets
162.275 Telemetry channel (MALSR lighting control, wind shear alert system, NavAid controls, voice/digital paging, etc)
162.300 Telemetry channel alternate, Southern Region Maintenance secondary (Florida)
162.325 Telemetry channel alternate
162.350 Southern Region Maintenance Net (Florida), Telemetry channel
162.500 FAA Hurricane Net backup in Florida (may no longer be active)
164.825 Fire Department Dulles/Reagan National Airport (F-3)
165.3375 Repeater input to 166.175 (in locations where there is a repeater)
165.4125 Reagan National maintenance net (F-4)
165.4375 Repeater input to 166.175 (in locations where there is a repeater)
165.500 Dulles/Reagan National Police-Fire-Ops net (F-1)
165.6125 Administration/Maintenance Nets (repeater input in Pacific Northwest to 166.250)
165.6375 FAA Security Teams — Nationwide, Administration/Maintenance Nets
165.6625 Telemetry channel (Wind shear alert systems), Central Region voice net
Reagan National police net (F-2)
165.6875 Telemetry channel (NavAid control)
165.7125 Administration/Maintenance Nets
165.7375 Administration/Maintenance Nets
165.750 Scene of the Accident — Nationwide
165.7625 Telemetry channel (NavAid/Runway lighting control, wind shear monitoring, etc)
Scene of the Accident — Nationwide
166.0875 Dulles Airport Maintenance Net (F-4)
166.100 Administration/Maintenance Nets, Telemetry control
166.125 Seattle Maintenance net
166.175 Scene of the Accident — Nationwide, Administration/Maintenance Nets (repeater inputs include: 165.3375 and 165.4375)
166.250 Pacific Northwest Maintenance net repeater output (input 165.6125)
171.2625 Telemetry channel

Other FAA assigned telemetry channels:

162.7635 163.000 164.050 164.725 166.200 168.400
170.500 170.725 172.050

Other FAA voice frequency assignments:

164.025 164.050 165.5375 167.175 169.000 169.2125
169.575 169.600 170.150 170.200 170.400 171.000
171.975

♦ SoCal Fed Freq Shakeup

T.K. Ruffzarf (aka Ruff), SoCal's Top Fed Monitor, has started reporting some dramatic changes in the VHF federal radio spectrum in **Southern California**. Here is some of what Ruff has heard.

"Since the FBI has given no indication they are switching any frequencies, all of these new frequencies I've been finding must belong to another agency, with serious encryption (Alcohol, Tobacco and Firearms' new encryption has the same sound, as does Border Patrol's). So all the 167/168/169/171's I've found (mostly old FBI frequencies), must belong to a new agency. Traffic pattern analysis indicates testing and setting up of a system. Inputs are mostly in the 162 Border Patrol band, some others like 163.3625, 163.3875, 162.1125 and 171.5125-.7875 band with 12.5 separation (some are inputs, some are outputs, i.e. 171.5125 goes in to 172.4, 171.5375 is repeating something else. Most outputs are all of the FBI .25 167 splits. (i.e. FBI on 167.3875, new output on 167.375). I've found two channels with about 10 outputs, three or four with 3 or 4, and numerous 1/1's. (167.550, 167.575, 168.825, just to name a few.). Control channel for San Diego County 1 and 2 seems to alternate between 162.700, .725, .825, 164.8625. Searching 162-174, I can pretty much guarantee you'll start finding encrypted channels on (previously) odd splits."

♦ Captured On-The-Air

Our old friend Lindsay C. Blanton III who runs the best internet website for trunking information, *The Trunked Radio Information Homepage* at <http://www.trunkedradio.net>, recently monitored this interesting tidbit on the **U.S. Customs** frequencies: Lindsay wrote:

"I heard a Customs Air Asset mention to some ground units that their radios were reprogrammed this week. They referred to many of the old Alpha designators as 'TAC' designators. For instance, Alpha-1 was now 'TAC-1' and so on. Are we seeing some changes to the US Customs VHF Network?"

I think we are in for a lot of changes over the next few years in the federal bands in the wake of 9/11.

Georgia's Rod Jones has noted some new information on the **FBI comms** in the **Atlanta** area. He reports that 167.2375 was identified as Admin, and he could hear them on 167.4125 as well, but it was not as strong as 167.2375 and he doesn't think 167.4125 was a repeater input. Rod wonders what the relationship is between

these two frequencies – repeater pair or linked? He also reports an identification for 167.2125 as Robbery Alpha-4 (base to mobile), and Delta-2 (car to car). Rod also notes some testing by FBI communications techs on 165.550.

Rod also recently monitored a FLINT (DEA aircraft) on 418.750 MHz working around **Lithonia, Georgia** (due east of Atlanta), and the pilot stated he was going over to Covington airport to get some gas. Ron switched over to Unicom for Covington, where he identified a Cessna 68NQ landing for gas. The website *Landings* indicates that aircraft owned by Tejas Aviation Management, Ft Worth, Texas. Maybe we have another government front company to watch for.

Jeff Newton in **Oregon** reports that one of the UHF FEMA frequencies I had in a recent column is active in Eugene. He reports that 417.700 MHz is audible and will watch it closer and report any future activity.

Dennis Trapp recently monitored one of the many U.S. Capitol evacuations since 9/11 and passed along the following **Capitol Hill Police** frequency list:

169.225 PD 1
165.5375 PD 2
170.175 PD 3
162.250 PD 4
162.6125 PD 5

Paul Perretta, G3SEA/KH6, checks in from the big island of **Hawaii** that NASA HF frequency 20186 kHz is alive and well with data communications. Paul thought that the frequency was only used during shuttle missions and asks, "Is it an ISS/Ground network data frequency?" *Readers? -LVH*

Also from Hawaii on vacation, Mr. Fast Food Freq Bob Eisner monitored communications associated with the visit of the Vice President of China to the island of **Oahu**. Bob reports:

"The Vice President of China showed up on Oahu this past Saturday and was staying at the Hilton Hawian Village on Waikiki Beach. I was monitoring the Hilton Hawian Village Security on their standard frequency of 463.8000 PL 141.3 when I overheard a conversation about the Vice President of China showing up that evening. I immediately started searching the 406 thru 420 MHz band and managed to find the US Secret Service on 408.1000 PL 151.4. Most of the traffic on this frequency was simplex; however, they did have a local repeater to setup cover some of the interior sections of the hotel. I tried searching for the input frequency, but never found it."

◆ U.S. Forest Service Monitoring

Speaking of Bobs, our own Bob Grove checks in with a channel plan (from an equipment bid list) for the **U.S. Forest Service**. The list on the Forest Service website stated, "Base sample units submitted for test and evaluation shall operate on the following standard test frequencies unless prior coordination for changes have been made with the Forest Service."

Thanks, Bob, for sharing this with our readers.

Band	Frequency (MHz)
Low	38.49 TX/RX
High	168.625 TX/RX
High(Repeat)	168.625TX/168.025RX
UHF	415.500 TX/RX
UHF (Repeat)	415.500TX/410.500RX

For a base radio with a frequency spread capability of 5 MHz (Tx) and 3 MHz (Rx).

Channel	TX Frequency (MHz)	RX Frequency (MHz)
1(center tune)	168.625	168.625
2	171.125	170.125
3	166.125	167.125

"Mobile and portable radios shall be capable of being programmed for operation using both narrowband + 2.5 kHz maximum deviation and wideband + 5 kHz maximum deviation channel spacing on any channel within the operating band of the radio. Synthesized mobiles and portables shall have the frequencies listed below as the receiver test frequencies for Narrowband (NB) and Wideband (WB) channel spacing."

NB Ch.	TX/RX	WB Channel	TX/RX
1	150.800	7	150.800
2	156.030	8	156.030
3	162.000	9	162.000
4	168.625	10	168.625
5	170.000	11	170.000
6	173.9875	12	173.9875

And finally, Ty "The Scanner Dude" Logan reports on the Fedcom newsgroup the following **USFS** frequencies used at the **Bullock fire** on Mount Lemon, just north of Tucson in the **Coronado National Forest (CNF)**.

Channel	Function	Freq	Use
1	Tac	166.725	Div Q/T, "Bullock" fire Operations frequency, Tac net for Divisions D, E, and Structure
2	Tac	166.775	Div P, "Bullock" ground tac
3	Tac	168.250	Div M/N "Bullock" fire
4	Tac	171.9375	Div O "Bullock" tac
5	Command 4 (s)	166.6125	"Bullock" fire Command Net (simplex)
6	Comm. 4 (R)	166.6175 rx	168.400 tx pl 110.9 "Bullock" command 4
7	Command 1 (s)	168.700	"Bullock" fire Air Attack Command
8	Comm. 1 (R)	168.700 rx	170.975 tx pl 110.9 "Bullock" fire Air Attack Command
9	Command 3 (s)	168.075	Command "Meritt" fire "Bullock" Command 3
10	Comm. 3 (R)	168.075 rx	170.425 tx pl 110.9 Command "Meritt" fire "Bullock" Command 3
11	Tac	154.280	Structure Protection ("Bullock" Structures)
12	Forest Net (R)	168.150 rx	172.275 tx pl 110.9 CNF Fire Net
13	Air-Ground	163.325	"Bullock" fire air-to-ground
14	Air Guard	168.625	Air Guard "Meritt" fire, "Bullock" fire

UHF Logistics:

Grp 1 Ch 3 (Log 6)	417.500 rx	412.150 tx Mt. Bigelow Repeater
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Grp 1 Ch 7	417.500 simplex	"Bullock" Logistics
Grp 1 Ch 1	417.300 rx	411.750 tx link Repeater 4*
*(Note: links C1, C3 & C4 repeaters) "Bullock" fire Command Net (Log 5)		
	411.925 simplex	Fire, Security "Bullock" Security

Other Frequencies

118.950	Air Ops Victor Fixed Wing, also Rotor air-to-air "Ryan" fire, "Bullock" fire
119.475	"Bullock" fire alt fixed
122.125	"Turkey" New Mexico
122.225	Victor Phoenix brush fire (BLM?), "Bullock" fire fixed air-to-air "Martin" fire, "Cerro Pelado" New Mexico
122.425	"Borrego" New Mexico
122.575	"Oversite" fire
122.700	"Bullock" fire Air Attack air-to-air
122.750	Fixed Wing "Meritt" fire, "Bullock" fire air-to-air to and from Libby
122.850	Rotor wing Air-to-air "Ryan" fire, "Bullock" fire
122.925	"Oversite" Fire
122.950	"Pennasco" New Mexico
122.975	"Oversite" Fire
123.025	Helio's "Meritt" fire, "Borrego" New Mexico
123.075	Fixed wing Air-to-air "Ryan" fire, "Gardner II" fire, "Bullock" fire fixed Cerro Pelado" New Mexico
123.100	"Middle Ponil" New Mexico
123.450	"Bullock"
123.925	"Oversite" Fire
123.975	Libby Tanker Base Ops, "Bullock" fire helicopter base
125.175	COF "Tram"
126.325	TNF "Pinto Valley", PNF "Indian"
135.675	TNF "Pinto Valley", PNF "Indian", COF "Tram"
135.950	Air Ops Victor Rotor Wing, "Bullock" fire rotor air-to-air
135.975	CNF Tanker air-to-air
163.100	Crew Burn Ops only CMD/TAC, "Ryan" fire, "Bullock" fire burn ops
166.625	"Meritt" fire air-to-air
168.050	"Meritt" fire Tac "Div. A", "Ryan" fire Tac
168.200	"Meritt" fire Tac "Div. B"
168.350	Air Ops Deck Helicopter Base CMD/TAC, "Bullock" Fire transportation
168.600	"Meritt" fire Tac "Div. C"
169.150	CNF Air-to-Ground
169.600	CNF Forest Net
170.275	COF "Tram"
171.050	"Borrego" New Mexico
411.475	"Bullock" fire flight following
411.525	Fire Net, "Bullock"
415.525	Forest Net, "Gardner II" fire, "Bullock" fire

Next month we will pick up on our Metro profiles with the city of Chicago. If you live in the cities of Houston, Philadelphia, Phoenix, San Diego, Dallas, San Antonio, and Detroit, your profiles will be coming shortly. In fact, we would like to hear from monitors in those cities with information you have discovered while scanning the dials. You can write us at the email in the masthead or send us email via the regular *MT* address in Brasstown. 'Til next month, 73 and good hunting.

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TRACKING THE TRUNKS

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Dan Veeneman

dan@signalharbor.com

When to Buy a Trunk-Tracking Scanner

Over the past few months we've heard several announcements about upcoming scanners with many new capabilities and features. Most listeners enjoy the new gadgets, but is it really necessary to have the latest and greatest scanner?

Hello Dan,

I was just reading one of your articles on Trunk Tracking. I'm just getting ready to upgrade my equipment and I'm trying to figure out whether it's really necessary to buy an actual trunk tracking radio or, to save some money just buy a regular scanner and program in all of the options.

In theory, I would miss bits and pieces of transmissions if I didn't have a trunk tracking radio, but if I just were to program in the 15-20 frequencies and leave the delay off, I'd have a pretty decent chance of catching the transmissions, as they bounced around, on a regular scanning receiver.

What are your thoughts on that? I figured that I'd best come to an expert before tossing my hard-earned money down the tubes.

Regards - Jim

Looking at a normal trunked radio system, there are three different kinds of information being sent from a repeater tower. One type is the voice traffic – the analog sound from the user who is talking. The second type of information is the sub-audible data stream that is carried along with the voice traffic, identifying the talkgroup and in some cases the user who is speaking. The third type of information is carried on the control channel (in Motorola and EDACS systems), providing talkgroup activity and overall system information.

A "regular" (conventional) scanner will receive the voice portions just fine, and as long as the system is analog you'll hear the transmissions that make up a conversation. In a pinch I've even used my venerable Bearcat BC200XLT, now more than ten years old, to monitor voice transmissions on a trunked system. That's the good news. The bad news is that you'll miss out on all the benefits of being able to make use of the other two types of information.

Remember that in a trunked radio system, it's possible for many or all of the voice channels to be busy at the same time. Without any way to sort out the traffic, a conventional scanner will simply stay on a busy fre-

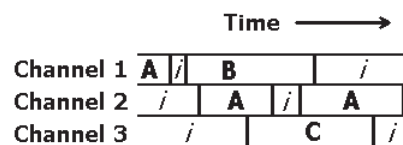


In a pinch I've even used my venerable Bearcat BC200XLT to monitor voice transmissions on a trunked system.

quency until it goes quiet, then move on to the next busy frequency. Since in most systems there's no guarantee that an entire conversation will stay on the same frequency, you may very well end up missing more than just "bits and pieces." You'll hear part of one conversation, then jump to another part of a different conversation. I'd bet that you would become frustrated pretty quickly.

Even worse, some trunked systems, especially EDACS, have a "tail" after each transmission. Sometimes the tail is a steady tone, other times it's an irritating buzz and occasionally it's the "GE brings good things to life" theme music. No matter what it is, however, it will keep your scanner squelch open and you may miss the next part of the conversation as it takes place on a different channel. Trunk tracking scanners avoid this problem by decoding the sub-audible data sent at the end of a transmission to signal a switch to another channel.

By decoding and using the other two types of information, a trunk-tracking scanner can fol-



Example of a three-channel system where up to three conversations (A, B and C) can occur simultaneously. When not in use channels are idle (i).

low a particular conversation regardless of which channel it is on. It also allows you to ignore talkgroups that you're not interested in, which can be important if, say, two fellows in the city water department are yapping about last night's ball game at the same time the police dispatcher is coordinating a high speed car chase.

You will also miss out on seeing the actual talkgroup identifiers that a trunk tracker can provide. Figuring out the different users on a system is much more difficult if you can't reliably identify the group that each transmission belongs to.

In short, your success will depend a great deal on the activity level in the systems you're trying to monitor. For small systems that aren't very busy or large systems during the wee hours of the morning, your suggested method of monitoring might work fairly well. As long as there is only a single conversation taking place at any one time you should be able to hear each transmission and make sense of them all.

Finally, you'll quickly be reminded to do this, but remember to lock out the control channel frequency – the buzz of data is very annoying. The control channel may change from day to day, so don't be surprised if you have to lock out different frequencies on different days.

◆ Uniden Scanner Testing

Uniden is in the process of "fine-tuning" their new digital scanners prior to releasing them. Part of this process involves checking the scanner's operation on various APCO Project 25 systems across the country.

Scott Carpenter, the Bearcat Product Manager at Uniden America Corporation, has asked for confirmed information about which APCO 25 systems are fully operational. In particular, Uniden would like to know operating frequencies in the VHF, UHF or 800 MHz bands; whether they are conventional, trunked with an analog (3600 baud) control channel or trunked with a digital (9600 baud) control channel; as well as locations that have strong coverage. If you have any solid information along these lines you can e-mail it to me or directly to Uniden at apco25@uniden.com.

◆ Lightning Strikes

In addition to coverage and performance problems, the trunked radio system serving the Washington, D.C., fire department was brought down for more than ten hours in June due to lightning. The \$5 million digital sys-

tem was installed in January of last year and operates from four towers in the District of Columbia. Lightning struck two of those towers, forcing firefighters to use cellular telephones while the radio system was down. An interesting comment came from a Fire Department spokesman who claimed the four-site system was inferior because it was actually optimized to work from 19 towers. No wonder complaints of poor coverage continue to plague the system.

❖ BC780XLT Computer Control

In previous columns I've discussed using a computer to control the operation of trunk-tracking scanners. Depending on your radio, there may be a number of programs that make scanning easier and more enjoyable. I appreciate hearing reviews from readers about software they've tried, whether good, bad, or a mixture of both.

Dan, I wanted to take a few moments to tell you that your June article in Monitoring Times encouraged me to go out and find a PC control program for my Uniden BC780XLT scanner. I have owned this fine scanner for several months, and had considered getting a control program for it. But, your article spurred me on. After going to the Strong Signals web site to check out what my options were, I decided on the program from BlackBag Software.

I purchased two software control programs from BlackBag. The 780 control program and the BC245XLT control program. I should note that the 780 control program I purchased was less than half the cost of some of the major programs on the market today, and it even comes with a control cable include in the price. The software loaded right up without any problems and runs quite well on my Windows XP Pro system. So I presume it will work equally well with earlier versions of Windows, including Windows 2000. I was able to get the program configured in a matter of minutes, and was doing Service Searches and Trunk tracking almost immediately. The user interface is clean and functional and very intuitive.

Also, for the same price of \$28.50 (\$25 + \$3.50 for priority mail), I got BlackBag's Frequency Logger program, which is a nice addition to operating my 780.

If there is a weak point in the package that I bought, it is that no documentation comes with the program. You are prompted to take action through pop-up dialogue boxes, but I can't find a documentation file on the CD or on the company's website. Also, there does not seem to be any help available through the program. Maybe I've missed something, but I've looked several times without success. Though using the program was easy for me, it might not be as easy for someone who is still fairly new to working with Windows.

The website address I went to, to get this program was: <http://www.bc780xlt.net/>. They also carry a Palm Operating System (OS) control version of the program.

That's it. I just wanted to let you know that

this program is well worth the money for anyone looking for a good, "fairly priced for what you get", control program for their BC780XLT.
Jeff in Denver

This software was also reviewed by John Catalano in the December 2001 issue of *Monitoring Times*.

As a reminder, Rich Wells has a very good web page at <http://www.strongsignals.net/access/content/software.html> that has a good list of scanner software websites sorted by receiver type.

❖ Canton, Ohio

In March of this year the city of Canton, Ohio, contracted with Motorola for an 800 MHz trunked radio system. Two repeater sites will operate six voice channels for the city, which will also purchase 400 digital radios. The system will be "mixed mode," meaning both digital and analog radios will be supported. This allows a gradual transition to digital technology while allowing the existing investment in radios to be used.

Canton currently operates a Motorola Type I analog system on the following frequencies: 852.5375, 853.0375, 854.0375, 854.5375, 855.0375 and 860.2875 MHz. A suggested fleetmap is to use S4 for blocks 1 and 2.

❖ Summit County, Ohio

Summit County, Ohio, and the city of Akron, Ohio, have jointly agreed to purchase an \$8 million Motorola ASTRO system for public safety use that will work with the existing Akron system. This "mixed mode" system will allow the use of both analog and digital radios and is capable of being upgraded to future 700 MHz frequencies when they become available. The system will have six voice channels and operate in simulcast mode from five repeater sites. It is expected to be available in early 2003 with initial use by the county sheriff and county public works departments. County dispatch is planned to occur out of a new center located where Akron currently dispatches. Summit County is home to more than half a million residents and currently uses the frequencies 460.100, 460.1375 and 460.425 MHz for County Police.

At present the city of Akron operates a Motorola Type II (analog) system on following frequencies: 852.0875, 852.1125, 852.3875, 853.1125, 853.3625, 853.5125, 854.2625, 855.2625, 866.0375 and 866.2875 MHz. Akron Police dispatch is reported on talkgroup 2064 (hex 0810).

And yes, one of the selling points of the new system was the ability for Summit County users to interoperate with the city of Canton, which is only 20 miles south of Akron along Interstate 77.

That's all for this month. Try to stay cool in the summer heat, and check my website at <http://www.signalharbor.com> for more trunked radio information. I also welcome your e-mail to dan@signalharbor.com. Until next month, happy monitoring!



Visit the Monitoring Times website today at:

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NOTICE: It is unlawful to buy cellular-capable scanners in the United States made after 1993, or modified for cellular coverage, unless you are an authorized government agency, cellular service provider, or engineering/service company engaged in cellular technology.

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Fly the World by Computer

Welcome aboard. The time was never better for combining your computer with your aviation hobby. We have two original product reviews today as well as an update on another, so let's get started!

❖ PC-HFDL Update

In our June column, we talked about Charles Brain's high frequency ACARS decoder, which was available as freeware. Recently, Charles has finished work on his commercial version (the freeware version is still available), and it may be purchased for US\$35.00 via his website (<http://www.chbrain.dircon.co.uk>). UK customers may contact him by email for alternative payment methods.

This is the supported version and it offers many new features, such as more extensive protocol support and interfaces to a number of commercial packages (i.e., AirNav Suite 4). It also includes email technical support for one year after purchase. One of the features I like best is the ability to use *DX Atlas* in conjunction with the software so that you can see where aircraft working an ACARS ground station are located. If you want to try it out first, you may download it from Charles' website and work it for 10 minutes. After that, the program shuts down.

After you purchase the software, Charles will send you the license key within 24 hours. If you are at all interested in HF ACARS decoding, I heartily recommend this program. All you need is an HF receiver, a computer, and an audio cable to watch HF ACARS decoding as it happens!

Incidentally, I have a list of all the frequencies that are presently assigned to the HF ACARS stations. If you would like to have a copy, send me an email, and I'll send one out to you. (You can also find them in the *July Utility World* column - ed.) Of course they are not all in use at all times (remember propagation rules!), but if you try the higher ones during the day and the lower ones at night, you'll generally make out okay.

❖ Air Traffic Control Simulation

This is an ATC simulation which takes place in the terminal radar approach control (TRACON). First released in early 2001, it has undergone several major changes with



patches and upgrades since then. Now it really is a simulation worth considering for ATC fans. There are 48 TRACONS included in the original software and sector expansion disks available for purchase as add-ons, so it will keep you busy for as many hours as you want to work at it. You (as the controller) can choose to work Approach, Departure, or both. With features such as real world pilot Artificial Intelligence, simulated pilots tend to behave just as pilots do in the real world - for instance, they don't always hear what you are saying and don't always do what you tell them.

Another interesting feature is that **ATC Simulator** supports voice recognition through Microsoft's Speech API. It is really the epitome of realism to be able to speak directly to the pilots! However, the aircraft are also controllable with keyboard commands as well: You choose.

Some of the other goodies found in this program include the ability to access real data tags for each flight, real aircraft symbol representations, and aircraft trails. There's also an authentic radar screen with the ability to adjust intensities, turn on or off specific information, and a radar sweep.

To quote the ATC Simulator website text, "The basic challenge of the TRACON, specifically approach control, is that you have aircraft entering the terminal airspace of the one busy destination airport from all directions. There may be none for a few moments and then five might arrive all at once. Your role as the approach controller is to systematically sequence and safely separate aircraft by issuing radar vectors to a final approach point where they can fly their approach into the airport. When a controller's job is done properly, aircraft are lined up no less than 3 miles apart flying down the glide slope for a particular runway, also known as the 'string of pearls.'"

"It's not a random world in ATC Simulator, it's the real world. All traffic at each TRACON is based on real air traffic that flies into and out of that airport. So you won't see a United Airlines flight

number, normally seen at DFW, at JFK.

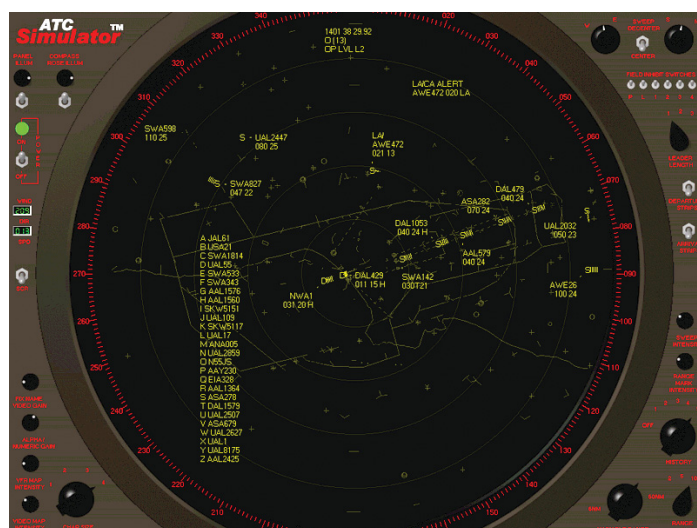
"The mix of aircraft types is based on the same data, too. You'll get a realistic mix of heavies, lights, business jets, and so on, that a particular airport experiences.

"Stack 'em up! Busy period? Delays at the airport? You can even put your aircraft into holding patterns. They will enter holding patterns via appropriate sector entry patterns and hold according to published holding procedures for that holding point. Stack 'em up and then pick them off for their final approach when a slot becomes available. Don't keep them holding for too long, though. They only have a certain amount of reserve and they'll start running out of fuel." (Thanks to ATC Simulator for permission to use parts of the description.)

There are quite a few different pilot voices included in the software and others you can add on from the website (<http://www.atcsimulator.com>). In addition, aircraft engines and other noises can be heard in the background when the pilots speak.

ATC Simulator will keep track of your career and rate you according to criteria in the FAA's Air Traffic bible - the 7110.65.

Check out the ATC Simulator website. There's a lot to see there. For instance, there's a forum for Simulator users, ATC links, a very detailed simulator description, and more. I'm convinced that this is a simulation whose time has come. For \$29.95 (on sale from \$59.95!) from **PC Aviator**, it's almost a steal. The simulation can be ordered directly from the ATC sim site, along with extra sector CDs if the 48 sectors included with the simulator aren't enough.



Or, you can call to order at 800-664-0033.

After many conversations with the originator of the program, Russell B. (Brad) Davis, who is no stranger to the world of ATC, and after playing with my purchased simulator, I'm quite taken with it and look forward to the next version that I hear is going to have some *real* surprises. I've only found one fault with ATC Simulation, and that's the fact that the TRACONS only have time slots to work from 6 am until 12 midnight. Now those of us who monitor TRACON communications know that they are open 24/7, 365 days a year, and some major TRACONS have very busy periods from 1 am through 5 am, due to the "box haulers" (freight airlines) that come and go during those hours. However, this simulation has so many other good features that this one glitch can be overlooked.

I think that you will really enjoy it. Good luck with your ATC career, and let me know how you're doing!

◆ AirNav Suite 4

Last year (October 2001) we discussed AirNav 3 and the additional software (SelCal Decoder, AirNav Lite, and ACARS Decoder) that AirNav Systems offered as well. Hold on to your hats, folks – here comes AirNav Suite 4!

This is a completely new program and, as the text says at AirNav's website (<http://www.airnavsystems.com>), "The management of data is now based on faster and easier to use databases. Simultaneous Internet download and data processing makes this feature much easier; because AirNav Suite 4 intends to be as realistic as possible, accuracy is at its best. Some of the main features include:

New Management of data

New ACARS and Selcal Realtime Interfaces

ACARS, HF and VHF Realtime Tracking and Monitoring

Semi Realtime Internet Tracking (300 flights an hour worldwide)

View photos of tracked aircraft

Automatic flight information in Terminal mode

Realtime Weather Information

Flight Data from WACARS databases

Information ticker and Auto Time set

Backup of database data

New Log and Map file formats

Sunrise/Sunset views

Compatibility with all ACARS decoders (including PCHFDL)

Supports DDE (Dynamic Data Exchange) and FWD (File Write Detection)

Multi-Window tracking

Accurate estimation of times and waypoints

New online help

New Flight List Panel

And much more than I have room to list here!

Can you imagine 100,000 waypoints, a new graphical display showing VOR, NDB, Airports, ACARS Ground Stations, and ATC boundaries being included in one software pack-

age? Believe me, they're all to be found in AirNav Suite 4!

One of my favorite features is the new dynamic map interface; in addition, you can create a map, zoom and resize it with just a few clicks of your mouse. Another is the ability to view photos of tracked aircraft. Not another aircraft of the same type, but the same aircraft you're tracking!

Another welcome feature is the program's compatibility with all available commercial and freeware ACARS decoders. It shows realtime information of each message received and tracks the flight if geographical info is received in addition. And, for those of us who are also interested in decoding Selcals, there's a completely new interface that enables the user to receive data from the AirNav Selcal Decoder in realtime and integrate it with AirNav Suite 4.

System Requirements include Windows 95, 98, ME, NT, 2000, and XP. Download size for this program is 7.5 Megabytes.

Data Source Requirements include:

ACARS: AirNav is compatible with AirNav ACARS Decoder, Airmaster 2000, Skyspy, WinRADIO, WACARS, KRACARS, ARD2, and PCHFDL.

SELCAL: Compatible with AirNav Selcal Decoder

HF/VHF: HF and VHF Receivers

The cost of the program is \$69.95. If you purchase AirNav Suite 4 and AirNav Internet Lite as a package, it will cost \$119.95 (that's with 10% discount). Purchasing AirNav Suite 4, AirNav ACARS Decoder, and AirNav Selcal Decoder will net you a 20% discount (\$144.95 with the discount). If you buy AirNav Suite 4, AirNav Internet Lite, AirNav ACARS Decoder, and AirNav Selcal Decoder, you will also receive 20% off: the whole package will cost only \$164.95!

Bottom line is that I personally think that AirNav Suite 4 is great. The new features are outstanding and make the program even more exciting and useful than before. Try it – you'll really like it!

◆ More Sydney Airport Frequencies

Two months ago, we visited the Sydney (Australia) Airport Enthusiasts Website and listed Tower, TRACON, Ground, and other frequencies. Today, we'll look at the company freqs of airlines who have flights in and out of Sydney.

Company Frequencies, Sydney, Australia

126.400	Impulse/Express Airlines/Premier Airlines
128.800	Ansett
129.250	Norfolk Jet Express
129.300	Eastern Australia Airlines
129.500	QANTAS
129.900	Fuel Services
129.975	Cathay Pacific
130.050	All Nippon Airways
130.200	Condor/Canada 3000/AOM France/Freedom Air/Lufthansa/Olympic
130.450	Garuda Indonesia
130.600	Ansett International-Regional/Britannia Airways/Eva Air-

	lines/Malaysian Airlines/Martinair/Vietnam Airlines
130.650	QANTAS
130.950	Ansett Apron DOM 2 & DOM 3)
131.100	Thai
131.150	Virgin Blue
131.200	KLM/Alitalia
131.250	QANTAS/Royal Air Force VIP/RAAF VIP/Australian Army VIP/Fastair/Royal Brunei
131.400	United/Lauda Air
131.500	Aeroflot/Egyptair/Federal Express
131.650	Eastern Australia Airlines
131.700	Aeroflot/Air Caledonie/Air China/Continental Micronesia/ Air Nauru/Japan Air System/Air Vanuatu/All Nippon Air- ways/Airtours International/AOM France/ American Trans Air/Aerolineas Argentinas/Asiana/Middle East Airlines/ Egyptair/Canada 3000/Evergreen International/Federal Express/Garuda/Gulf Air/ Korean Air/Lauda Air/ Manda- rin Airlines/Air Niugini/Air New Zealand/ Northwest Air- lines/Air Pacific/Polar Air Cargo/Phillipine Airlines/Prem- ier Airlines/QANTAS International/Royal Tongan Air- lines/Singapore Airlines/ British Airways/South African Airways/World Airlines
131.800	Cathay Pacific/Japan Airlines
131.900	Alitalia/Singapore Airlines
132.650	QANTAS
451.700	Garuda Indonesia
451.800	Air New Zealand
452.000	QANTAS Catering
453.900	Singapore Airlines
454.700	Cathay Pacific
455.000	Lauda Air
455.050	Thai Airways
455.800	Olympic Airways
456.200	Egyptair
456.325	Thai Airways
461.100	QANTAS Property Maintenance
461.150	QANTAS Engineering
461.200	Garuda Indonesia
461.225	QANTAS Engineering
461.250	QANTAS Passenger Handling
461.300	Air New Zealand
461.850	QANTAS International Terminal
462.025	QANTAS
462.800	Malaysian Airlines
463.400	Singapore Airlines
464.200	All Nippon Airways/Cathay Pacific
464.500	Lauda Air
464.550	Thai Airways
465.300	Olympia Airways
465.700	Egyptair
465.825	Thai Airways

If you're one of our readers from Down Under, or maybe planning a business trip or vacation to Sydney, you're all set now to do some monitoring at that beautiful airport. While you're there, don't forget to say G'day for me, too!

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Television Update

There have been a number of recent developments on the television front affecting DXers. Digital television is off to the races; there have been major programming changes at several high-powered analog stations; and dozens of new low-power analog stations have been authorized.

◆ Digital

In theory, all commercial TV stations were supposed to have their digital transmitters on the air by May 1st. In practice, the vast majority of stations missed the deadline. According to Chip Kelley's excellent <http://www.100000watts.com> website, only 419 digital stations were operating as of the end of May. Most of the rest have requested six-month extensions of their digital permits. FCC Commissioners do not appear to be very happy about the slow rollout of digital. Plans are being made for sanctions for stations which missed the May 1 deadline without good reason. That said, many stations did have good reason – everything from zoning problems (especially difficult in Denver) to defective mechanical equipment for lifting antennas, to delays in FCC approval of technical changes.

Quite a few stations did show up just before – or on – the May 1 deadline. Some of them have special temporary authorization to operate at relatively low power. For example, Fox's WHBQ-DT in Memphis is authorized for 1000 kW from a 234-meter tower, but came on the air with a temporary authorization for only 1.2 kW at 65 meters.

◆ Analog

On the analog side, there have been some major programming changes. In the Twin Cities, UPN station KMSP-9 and Fox affiliate WFTC-29 are swapping networks – channel 9 becomes Fox and 29 UPN. I might guess channel 29 will change call letters as the current calls stand for "Fox Twin Cities." In Jacksonville, Florida, after 53 years WJXT-4 was unable to negotiate a new contract with CBS. WTEV-47 will switch from UPN to CBS; WJXT will become an independent station. In nearby Live Oak, Florida, WFXU-57 is dropping Fox. They will become a UPN affiliate.

Finally, in Arizona, NBC has purchased the permit for new station

KPHZ-11 Holbrook. KPHZ's digital facilities will have some coverage of the Phoenix market, and should entitle the station to must-carry on cable there. There's already a powerful analog NBC affiliate in Phoenix (KPNX-12) but NBC now owns the Telemundo Spanish-language network. Speculation is that KPHZ will be a Telemundo affiliate.

◆ And Undecided

When the transition to digital began, stations that already held a permit or license were assigned second channels for digital operation; they could operate analog and digital stations simultaneously. Many new-station applications were still pending. These applications, when granted, did not receive a second channel. They must choose to operate either analog or digital, but cannot do both at the same time. Those which begin with analog operations presumably will have to switch to digital at some point in the future.

KBEJ-2 Fredericksburg, Texas, took one approach to this problem. They have applied to the FCC to allocate channel 63 to Fredericksburg as a new digital allotment. KPHZ has taken a second approach; they have filed for permits for both analog and digital operation on channel 11. WTPX in Antigo, Wisconsin, has a third idea; they have signed on as a digital-only station on channel 46. There will be no analog operation for this station. I would be surprised if there are any digital receivers within the coverage area of WTPX-DT's 50 kW signal. However, if they pay for the digital-to-analog conversion

equipment, they can receive must-carry protection – and an analog signal – on the Antigo cable system. And if they pay to deliver the signal to other cable systems in the Wausau area, they can get on cable there, too. To my knowledge, WTPX is the first digital-only station in the US.

◆ A Guide to TV stations

The Worldwide TV-FM DX Association has published a guide to North American TV stations. This is a DXer's reference, listing stations by channel with power, network, and location information. Also provided are maps of stations on each channel. I would imagine a few copies are still left. They're \$25; visit <http://fmdx.usclargo.com/tvg.html> for more information.

◆ Bits and Pieces

On the AM side, WTTM-1680 has made a major format change. They've switched from sports to South Asian ethnic programming. That should stand out on the dial! Also in the expanded band, WHITE-1690 Johnston City, Illinois, has applied to move to Berwyn. That's a move of over 200 miles into the greater Chicago area! In Tulsa, long-time country music station – and common DX target – KVOO-1170 has joined the list of AM stations dropping music for a talk format. The call letters have also changed, to KFAQ.

Martin Schoech reports his "QSL Information Pages" have been updated. <http://www.schoechi.de> is the address. The site is in Germany, but many North American stations are listed.

Patrick Griffith in Colorado reports receipt of two new verifications for AM stations. CKOM-650 was verified via 2401 Saskatchewan Drive, Suite #210, Regina SK S4P 4H8, Canada. Verification of now-defunct KALT-1610 required a somewhat more roundabout method. Patrick's verification came via a Houston attorney who used to represent the station... With KALT off, it is unlikely there will ever be a full-power station on 1610 kHz in the USA.

Is anything interesting happening on the TV dial in your city? Write: American Bandscan, *Monitoring Times*, 7540 Hwy 64 West, Brasstown NC 28902-0098, or by email to w9wi@bellsouth.net. Good DX!



Digital TV station KTVI, St. Louis, as received near Nashville - 230-mile DX.

Voice of Laryngitis Returns to Shortwave

The **Voice of Laryngitis**, one of the all-time classic shortwave pirate stations, has returned to the air with new program productions after a hiatus of almost a decade. From a pirate programming perspective, this is the biggest news of the 2000's decade so far.

Station owners and operators Genghis and "Cowboy" Stanley Huxley were pioneers that ended up being major influences in the development of the classic pirate radio format, mixing rock music with originally produced parody and comedy shows. Several other Huxley characters invariably appear during the programs. Their classic "Pirate Busters" show, featuring a battle between dimwitted radio enforcement boss J. Eager Heaver of the FCC and the clever Laryngitis staff, remains one of the best shows ever produced in the history of pirate broadcasting. The new Laryngitis shows, widely heard recently on frequencies just below 6955 kHz, are up to this extremely high standard of pirate programming production.



Still using an accurate slogan of "The Best Damn Radio Station You'll Ever Hear," Laryngitis is easy to spot on the pirate bands because of its distinctive interval signal of a barking seal, frequently played throughout their shows. As always, the programs are still sponsored by Friendly Freddie's Budget Burials, "where death is cheap." Friendly Freddie has reached into his wallet and has padded his advertising budget, with the result that some of the best comedy audible on the radio today, either on licensed or pirate stations, is back on the air.

Pictured here this month is the rare Voice of Laryngitis special edition QSL featuring a girl promoting the station in an unusual outfit. If you hear their old and defunct Battle Creek, MI, address, you should ignore this obsolete contact point, since the station now corresponds with its listeners via the Belfast, NY, pirate maildrop.

❖ WBCQ Ship Transmitter Project

As reported in *MT* many months ago, legendary shortwave broadcaster Alan Weiner of WBCQ announced at the 2001 Winter SWL Fes-

tival in Kulpsville, PA, that the station would be operating a mobile shortwave transmitter from a ship traveling to waters in various nations in the Caribbean and elsewhere. Weiner, who has decades of experience in shortwave broadcasting, both in the pirate community and as a licensed shortwave broadcaster, has now announced that serious fundraising for this project has moved to a higher level. The planned transmitter platform on the *m/v Katie* and Weiner's current fundraising strategy are outlined at <http://www.complexvariablesstudio.com> on the internet. Weiner offers various radio-related premiums to financial donors, in an interesting take-off on PBS's fundraising strategies.

❖ Radio Sawa Schedule

We were a little premature last month when we said that **Radio Sawa**, the USA government's attempt to program an Arabic language quasi-clandestine service in Arabic through market research, was not audible on shortwave. Veteran DXer Jerry Berg provides a lengthy schedule for them that he got from the international broadcasting Bureau web site, advertised as the Middle East Radio Network, otherwise known as Radio Sawa. We list the transmitter sites here in parentheses after the frequencies. 0400-0600 UTC on 5965 kHz and 7255 kHz (Morocco), 9680, 11670 & 15380 (Iranawilla); 0730-0830 UTC on 9660 (Woofferton), 9715 kHz (Kavala), 9765 (Woofferton), 11820 (Woofferton), 11910 kHz, 11995 kHz, 15205 kHz and 15355 kHz (Kavala); 1700-2100 UTC on 6040 kHz and 7105 kHz (Kavala); 1800-2100 UTC on 9505 kHz, 11825 kHz and 15545 kHz (Iranawilla); and 2000-2100 UTC on 6160 kHz, 9620 kHz and 11895 kHz (Kavala). You can check for further updates at the <http://www.radiosawa.com> web site. If you hear this station, let us know.

❖ Radio Resistencia on the Web

Colombian rebel clandestine Radio Resistencia has not been logged in a long time by DXers, but it has invested in a web site that does not have much information on it at deadline time for *MT*. If you want to check it out, <http://www.radioresistencia.com/> is the URL.

❖ What We Are Hearing

For the first time in several years, last month the pirate loggings in *Monitoring Times* had to be postponed due to a flood of other news. We are cashing in our rain check this month, with a lengthy list of pirates heard by our readers during the last two months. North American pirate stations normally operate near 6955 kHz, but frequencies still

vary quite a bit with most stations recently using frequencies 5 or 10 kHz lower. Our readers heard all of these broadcasters:

Alpha Lima International- This Dutch pirate frequently makes an appearance via the ionosphere on this side of the Atlantic, recently using 15070 kHz on weekends. (Hoogeveen)

Betty Boop Radio- Rollo Vandigh programs ancient 1940s music and related nostalgia from the 1940s. (Providence)

Buckwheat Radio- Although they have not very active in recent months, they returned to shortwave this spring with a pop music show. (Uses buckwheatradio@hotmail.com e-mail)

Captain Morgan- Captain Ron has a new colleague on the pirate bands. Of course, pirates have a tendency to call themselves captains. Thus far this one has featured a format of rhythm and blues and/or rock music mixed with Twilight Zone audio. (None)

Deliverance Radio- This veteran old-timer has reappeared on the pirate bands. The format here is dueling banjos and river sketches. (None)

Ground Zero Radio- This station's name predates September 11; its programming lately has been rock music and discussions of psychology. (Blue Ridge Summit)

JBCN- This new station started as an example of how to start a pirate station in a program by **WHYP**. With the call letters standing for the James Brownard Communications Network, the station has been transmitting some programming of its own. (Providence)

KMUD- This west coast operation has been coming in again with drama programming and sound effects. It's tough DX in most North America. (Try Belfast)

NOEL- This Christmas pirate made a surprise appearance during the spring, creating Christmas in May with its news and weather from the North Pole. (None)

Numbers Parody- Two different numbers station parodies show up from time to time on the pirate bands. One uses Mexican foods like Taco and Tequila instead of the numbers, but the one heard recently uses sexual terms instead of the "spy" numbers. (None)

Oxycontin Radio- Their format has not been clearly classified yet, but they have been playing Big Band music lately. (None)

Paragon Radio- Although not widely heard yet, this new effort features jazz music with brief announcements. (None)

Psyco Radio- They were the most active pirate during the early months of 2002, but despite a falling frequency of transmissions, their elaborately produced programming can still be heard, including their original "Psyco Radio, we'll blow you away" jingle. (Uses psycoadihd@yahoo.com e-mail, but rarely replies)

Radio Metallica (fake)- It's been a long time since Dr. Tornado at the superpowered Radio Metallica has been on the air, but some pirates still produce shows using old tapes from the doctor's station, spliced together oddly for a humorous effect. (None)

continued on page 83

Surfing the Longwaves

August can be a difficult time for DXing the frequencies below 500 kHz. Static crashes and storms are common, and outdoor activities can take up a lot of our free time. For the determined listener, however, summer needn't be a time to put away the headphones. By concentrating your listening in the morning hours, before natural static has a chance to build up, you can still manage to log quite a few stations and perhaps even add some new ones to your log.

Planning a summer vacation? Why not bring a portable receiver to help you hear some new-to-you beacons. Remember to also pack your beacon directory, so you can ID new stations without having to wait until you return home. Summer is also a good time for sharpening your DFing skills by tracking down some local beacons. All you need is a portable receiver, map, and a compass. (You may also want to include a camera so you can record the success of your hunts.) This month's column includes a fairly long list of reader loggings to get you started in summertime listening.

◆ LORAN Interference—New Hope

The clickety-clack of LORAN navigation signals at 100 kHz is one of the biggest headaches for LW listeners living near coastal areas or the Great Lakes. In extreme cases, these pulsed signals can be so strong that they wipe out a considerable portion of the band and show up at places on the dial where they don't belong. Today, LORAN serves mainly as a backup to the satellite-based GPS system, but it is expected to remain on the air for several years to come.

Knowing that I live about 35 miles (56 km) from a LORAN station, a Canadian friend recently sent me a prototype filter designed to greatly reduce the reception of the 100 kHz signals. The filter is a small, shielded unit designed to be installed between the receiver and antenna, and requires no DC power for operation.

For my tests, I connected the filter between my Drake R8 receiver and a 250 foot random wire antenna. When I turned my receiver on, I was immediately impressed with the difference the device made in reception. Where LORAN had once registered S9 +10dB on my S-meter, it was no longer moving the meter, and was *barely* perceptible by ear. As a bonus, I was pleasantly surprised to find that desired signals about 50 kHz above LORAN were unaffected by the filter.

Rarely have I been so impressed with a receiving accessory, and I believe the device could



benefit anyone experiencing LORAN interference. More tests are being run by another listener who lives just 8 miles from a LORAN site, and I am anxiously awaiting his results. Meanwhile, I'd like to hear from *MT* readers about their interest in such a filter. Would you be interested in such a device if the price were reasonable? Please share your thoughts with me and I will pass the comments on to the filter designer. If there is enough interest, the filters may become available commercially.

◆ Loggings Galore

We have a nice set of loggings this month from Don Budesheim in Alberta. Don uses a Realistic DX-394 with a Palomar Engineers LF converter and an LFE-H800 Skymatch antenna. He lives just 1.5 miles from beacon QU/221 kHz, and receives some overload from this station at various points on the dial. Nevertheless, he managed to turn in a very respectable DXing log. Thanks for contributing, Don, and please write again.

We are also pleased to hear from Dan Wanchic (MN), who used a VR-500 scanner in mobile service to pull in his loggings. Dan uses a simple 26" mobile antenna at present, but is already thinking of ways to improve his reception with an antenna better suited to longwave. All of his loggings took place about 50-60 miles west of Minneapolis during short listening intervals. You may recall the discussion of Dan's "averted hearing" techniques in the June '02 issue. He used this technique to log several of the beacons listed here.

Finally, we have additional logs by Fraser Bonett (PA). Fraser is fairly new to longwave, and uses a Collins R-390A receiver with an LFE-111 converter and active antenna combination. Judging from his logs, I'd say this setup is working out quite well, especially for summertime reception. Welcome aboard, Fraser, and we look forward to hearing from you often.

FREQ.	ID	LOCATION	BY
205	YWO	Lupin, NT	D.B. (AB)
209	SYS	Stoystown, PA	F.B. (P.A.)
209	HCD	Huthinson, MN	D.W. (MN)
216	CLB	Wilmington, NC	F.B. (P.A.)
221	QU	Grande Prairie, AB	D.B. (AB)
239	VO	Val-D'or, QC	F.B. (P.A.)
241	YLL	Lloydminster, AB	D.B. (AB)
245	CB	Cambridge Bay, NU	D.B. (AB)
248	UL	Montreal, QC	F.B. (P.A.)
254	EUD	York, PA	F.B. (P.A.)
254	SM	Fort Smith, NT	D.B. (AB)
257	XE	Saskatoon, SK	D.B. (AB)
258	ZSJ	Sandy Lake, ON	D.B. (AB)
260	XCB	Carlisle, PA	F.B. (P.A.)
269	ZW	Teslin, YT	D.B. (AB)
272	ULM	New Ulm, MN	D.W. (MN)
275	PS	Phillipsburg, PA	F.B. (P.A.)
282	ROS	Rush City, MN	D.W. (MN)
289	YLO	La Tuque, QC	F.B. (P.A.)
302	XY	Whitehorse, YT	D.B. (AB)
307	M5	Manning, AB	D.B. (AB)
308	E	Edmonton, AB	D.B. (AB)
317	CBE	Cumberland, MD	F.B. (P.A.)
326	BHF	Freeport, Grand Bah.	F.B. (P.A.)
327	JMR	Mora, MN	D.W. (MN)
329	YEK	Arviot, NU	D.B. (AB)
332	YFM	Le Grande, QC	F.B. (P.A.)
332	VT	Buffalo Narrows, SK	D.B. (AB)
340	YY	Mont Joli, QC	F.B. (P.A.)
341	DB	Burwash, YT	D.B. (AB)
342	ST	St. Cloud, MN	D.W. (MN)
350	CBG	Cambridge, MN	D.W. (MN)
356	ZF	Yellowknife, NT	D.B. (AB)
359	YQZ	Quesnel, BC	D.B. (AB)
359	LXL	Little Falls, MN	D.W. (MN)
355	5F	Fox Creek, AB	D.B. (AB)
365	AA	Fargo, ND	D.W. (MN)
366	YMW	Miniwaki, QC	F.B. (P.A.)
368	VX	Defoe, SK	D.B. (AB)
368	YJF	Fort Liard, NT	D.B. (AB)
368	ZP	Sandspit, BC	D.B. (AB)
368	PNM	Princeton, MN	D.W. (MN)
371	ITU	Great Falls, MT	D.B. (AB)
372	YCO	Coppermine, NU	D.B. (AB)
375	FS	Fort Simpson, NT	D.B. (AB)
378	ZFA	Faro, YT	D.B. (AB)
379	YBE	Uranium City, SK	D.B. (AB)
379	OW	Owatona, MN	D.W. (MN)
388	UN	State College, PA	F.B. (P.A.)
389	IL	Willmar, MN	D.W. (MN)
400	PPI	St. Paul, MN	D.W. (MN)
404	XCR	Camp Ripley, MN	D.W. (MN)
407	RV	Reedsville, PA	F.B. (P.A.)
408	GYL	Glencoe, MN	D.W. (MN)
414	LYI	Libby, MT	D.B. (AB)
420	FQ	Fairmont, MN	D.W. (MN)

Good DX, and see you again next month!

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WR-3150 (External)	RCV 48-E	\$1849.95
WR-3150 (Internal)	RCV 48-I	\$1849.95**
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WR-3500 (Internal)	RCV 49-I	\$2395.95
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WR-3700 (Internal)	RCV 50-I	\$2895.95

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Satellit 800	RCV 33	\$499.95
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DRAKE

R8-B	RCV 3	\$1349.00
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JAPAN RADIO COMPANY

NRD-545	RCV 21	\$1799.95
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GE

SUPERADIO III	RCV 5	\$59.95
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YAESU

VR5000	RCV51	\$889.95**
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MISCELLANEOUS ACCESSORIES

ICOM RECEIVERS

UT-106 DSP upgrade kit	ACC 16	\$139.95
Remote control software for R75	SFT 24	\$59.95
OPC-131 DC Power Cord	DCC 4	\$11.95

AOR RECEIVERS

CTCSS for AR5000 & AR5000+3	ACC 96	\$99.00
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WINRADIO RECEIVERS

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Telephone Interface for External Models	ACC 6	\$950.00
PCMCIA PC Card	ACC 28	\$89.95
Audio Cable	CBL 3	\$10.00

DRAKE RECEIVERS

VHF converter	ACC 43	\$249.00
+ \$65 installation		
External Speaker	SPK 2	\$48.95

JRC RECEIVERS

Wide-band converter (less cellular)	ACC 11	\$349.95
High stability crystal	ACC 12	\$99.95
NVA-319 External Speaker	SPK 6	\$210.00

YAESU RECEIVERS

DSP1 Digital Signal Processor	ACC 1	\$119.00
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MISCELLANEOUS

Scancat Gold for Windows	SFT 2W	\$99.95
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Creative Club Programs

August is often the month in which the leadership of amateur radio clubs across the land hammer out their calendars for the coming year. This planning session often covers ideas about meeting programs. I can tell you from personal experience, nothing brings folks in and keeps them coming better than good presentations at club meetings. Likewise, nothing can dry up a club's membership faster than the same boring programs presented over and over again until the few remaining members can recite the program along with the presenter.

Let me pass along a few ideas to help you get your club's program planning moving along.

◆ The Long and Short of it

A great program can be had by simply taking a look at your club's membership list. Figure out the two members in your group that have held a ham ticket the longest time and the shortest time. That "Old Timer" could very well be somebody who was involved in radio back when ALL radio was amateur radio. Back when everybody built their own equipment from scratch.

Maybe it will be someone whose early radio experiences led to their military assignment during World War II. Very often you will find that this person is someone whose ham experiences led to a career in electronics.

The "newbie" can offer reflections on how different it is to become a ham in a world where radio communication is commonplace for every person. They can discuss how different it is to be a ham in the world of computers from the world of spark gaps.

The surprising thing you will probably find is that both of these folks probably came to ham radio for the same basic reasons. I'll bet they are both people who have a strong desire to understand the world around them and how it works. You'll probably find that the more things change, the more some things remain the same.

◆ CW Celebration

Yeah, I know the statistics...More hams use voice than code... Big deal!

A CW night is still a great idea for getting folks to understand this fascinating mode that continues to draw folks in spite of modern digital communications.

There are many ways you can go with the subject of CW. You can start by asking CW operators to bring in their keys, bugs, and keyers for a show and tell. Especially encourage folks to bring in unusual keys and bugs. Many modern hams have never seen a bug in use. Even a demonstration of keyboard-sent keying can give some folks a few ideas about how to interface their radio and computer hobbies.

You might also invite less frequent CW users to bring in their keys so the more experienced folks can show them how to adjust them and set them up for efficient use. Nothing can turn off a budding CW operator faster than a bad case of "glass arm" from a poorly set up key.

There are a lot more directions to go with the topic of CW. Sending and receiving contests are sometimes fun. Many modern hams have never experienced the joys and frustrations of a "QLF" contest. For those who don't know, QLF is the unofficial "Q" signal for "sending with the left foot," normally a negative term used to express somebody's on the air technique. But a contest based on the task of actually trying to make code sound good using the left toe on a hand key is a great deal of fun for participants and audience alike.

Out of this gathering of CW regulars and CW phobics you may institute a mentoring program where people who want to learn

more about the mode can be paired up with an experienced operator. They can make plans to get on the air together to help the beginner develop. And of course, the feedback from such a program would make an excellent topic for a future club meeting.

◆ Speaking of Modes...

CW is not the only mode that regular hams shy away from. Find out who in your club is involved in other non-voice modes and encourage them to share their experiences. I've played around a bit with PSK-31 but I really didn't get a good handle on it until I attended a club meeting where somebody went through the steps of setting up a station specifically to optimize the sound card settings. That one bit of additional information that went beyond any of the books I'd read opened up a whole new world of radio communication for me.

There are lots of modes that folks haven't tried simply because nobody took the time to show them the way. RTTY would make a great topic, as would satellite, weak signal VHF, SSTV, ATV, and moonbounce. Remember that AM is still a very popular mode among a select few hams and this would be a great topic. Especially when you compare how AM was done in the "old days" with how it is accomplished today.

Here's one I'd probably travel 100 miles to see. Hams have had the ability to use FAX over the air long before it came to every office in the world via telephone. I've never tried it on the air and I don't think I've ever run across anyone who has. I'd like to learn about amateur radio fax techniques even if they are no longer in common use.

Along those lines, maybe an old timer could tell folks what it was actually like to use a spark gap transmitter. Any mode, new or old, can make for a great evening's program.

◆ Antenna Night

One thing you discover rather quickly when you enter the amateur radio realm is that no two ham stations have antenna systems that are alike. And further, extremely few antenna systems are able to be erected "by the book." There are

"What does Chess have to do with Ham Radio? Read on!"



simply so many variables that what works for one person may not apply to another. On the other hand, maybe something that did work at my QTH might be the key to another person getting their signal to fly through the air with the greatest of ease.

A club program organized around folks sharing their antenna ideas could be of benefit to most members. There are dozens of related possibilities. Perhaps someone in the club recently went through the process of getting a variance to put up a tower. Knowing the political landscape around this issue would be of great value to anyone considering this kind of antenna structure. Someone else might have chosen to go the "stealth" antenna route and might want to share how they hid their sky wires from nosy neighbors. Another variation might be the kind of "quick and dirty" portable antennas folks take on trips and vacations. And how about successful techniques for getting your feedlines into the house (and keeping lightning out)?

It's hard to walk away from an antenna program without at least a few new ideas worth trying at your home QTH.

◆ Emergency Planning

This is a program I am scheduled to offer at a local club in the near future. In the wake of the events of September 11, 2001, even the general public has become aware of a need for a certain amount of emergency preparedness. As a longtime member of my local ARES and RACES organizations, my ham gear has always been set up so that it could be shifted "off the mains" and onto battery power in a moment's notice. Likewise, I have always kept emergency portable antenna materials at the ready. I also have a "jump" kit packed with personal essentials to allow

me to hit the ground running in support of a local disaster.

While a great many hams do this kind of preparation as a matter of course, a lot of our fellow amateurs have not taken the steps necessary for even basic operations during power outages and such. So a program that helps folks pull together the tools and talent to stay on the air under difficult circumstances has never been more relevant.

You can even start with the most basic ideas about how to hook up a 2 meter rig to a car battery safely and build on the program from there. If your club is not directly affiliated with ARES and RACES you may want to have representatives from that group speak to one of your meetings (yet another evening program!). Programs about emergency radio operations could literally save lives in your local community.

◆ Outreach Programs

Amateur radio has always been an important civic activity. What has your club done lately to remind your local politicians and professionals of this fact? How about a meeting where you invite your local community leaders (political and otherwise) to see what ham radio is and how it benefits society. Be sure to consider local police, fire and EMS organizations.

Another possibility would be to invite your local PTA or school board members around to see the educational benefits of amateur radio.

Your club can always offer a program to local Boy and Girl Scout groups as well as other youth organizations such as YMCA or PAL.

Other lifestyle oriented clubs might have an interest. For example boaters are often interested in adding HF ham radio to their cruising operations. Does your area have a chess club? You could let these folks know that there are hams who enjoy playing this game over the air. It doesn't take a great stretch of the imagination to figure out ways to show people how ham radio can augment the fun of their current hobbies.

Here's one you may never have considered: If you have been on the air for any length of time you know that there are a number of nets set up to aid missionary activities around the world. Most communities have some sort of clergy or ministerial association where local ministers, rabbis and imams network and share ideas. Why not invite this group to one of your club meetings to show them how amateur radio works?

Now remember, the goal of this kind of gathering is not to get all these folks to drop what they are doing in their lives and take up the cause of ham radio. It is simply a time where you reach out to your community to show that you are good neighbors who promise to be there in time of need. But don't be too surprised if one or two folks ask when your next license class will be held.

Don't forget that it might be easier to take this show on the road and provide the

program at one of their meetings than it would be to get these folks to come to your meeting. Even so, you will find it is well worth the effort in building community spirit and furthering the future of amateur radio.

◆ And Many More...

I'm sure these few notions I've put forth only represent the tip of the iceberg. Have fun coming up with some of your own ideas, too. Let me know of ways your club has thought "outside the box" at your meetings and we'll share it here in *MT*.

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Digging Into the RCA Voltohmists

Last month, I introduced a useful measuring instrument known as the Vacuum Tube Voltmeter (VTVM). We discussed the differences between it and the more common volt-ohmmeter (VOM) and talked about some of the ways in which the VTVM could help in your radio restoration work. We also took a quick peek at the two RCA VTVMs I've acquired for restoration on these pages – both of which are commonly found in radio flea markets at reasonable cost and either of which will serve well on your repair bench. These are the Junior Voltohmist (WV-77A) and Senior Voltohmist (WV-98A).

This month we'll begin by examining both units inside and out to determine what would have to be done to put them both in first-class operating condition.

◆ Downloading a Manual

When carrying out an evaluation like this, even at the preliminary stages, it's important to have documentation at hand. The '77A came with a manual, but the '98A did not. Luckily, I was able to obtain one immediately by downloading it from the BAMA (Boat Anchor Manual Archive) site at <http://bama.sbc.edu/>. For those not familiar with the term, "boat anchor" is an affectionate way of referring to vintage tube gear. As you might guess, the reference is to the great weight of such gear as compared to its solid state descendants.

The manuals found on "BAMA" primarily cover vacuum-tube equipment originally intended for the ham or shortwave listener market. They are posted by volunteers who scan and upload manuals in their possession, and are free for downloading by all who have need of them. Reproduction quality varies, depending on the condition of the original hard copy and the contributor's choice of resolution settings. Luckily the '98A scans were good enough to yield a decent printout after a bit of tweaking in Photoshop (an image processing program).

◆ Exterior Examination

The exterior appearances of the two units presented quite a contrast. The '77A looked almost mint except for its test probe – which was taped together in two spots and looked as if someone had once stepped on it. The '98A was intact and complete, but covered with grime. The paint on its case was cracked and chipped, as if the instrument had lived in someone's toolbox for quite a while. I also noticed a fairly deep scratch or two on the meter's



The Senior (left) and Junior Voltohmists as purchased. The Senior unit still has its price tag – which was reduced to \$4.00 by the seller as he saw me examining the instrument with a jaundiced eye.

plastic front. The probe was present and in good condition, though for some reason a previous user had attached an extra ground lead to its cable connector. Why the factory ground lead, still emerging from its opening under the connector complete with alligator clip, needed to be supplemented I can't guess.



Junior Voltohmist's probe presented a discouraging appearance because of its friction-tape bandages – but was responsible for the low (\$5.00) price of this otherwise-mint instrument.

Before opening the cases of the two units, I decided to remove the friction tape "bandages" on the '77A's probe to get a better idea of the damage. Indeed the case was badly cracked at the two taped locations, though the probe appeared to be still functional. In the process of examining the probe, I found that it was an RCA WG-299C, not the WG-218/217 normally supplied with the unit.

What's the difference? In most VTVM designs, a 1-megohm resistor is inserted in series with the test lead for d.c. measurements and removed for a.c. and resistance measurements. The WG-218 was a direct probe (no resistor), with cable for attachment to the test instrument. For d.c. measurements, the WG-217 module (containing the 1-megohm resistor) was used. One end was slipped over the probe of the WG-218 and the measurements were made using a probe at the other end. The '299C requires no attachments; a slide switch on its bar-

rel cuts the 1-megohm resistor in and out of the circuit as required.

The slide-switch arrangement, which seems a lot more convenient to me, also avoids the problem of the serviceman losing track of his little resistor module just when it is needed for an important measurement. The Senior Voltohmist had a slide-switch probe as original equipment and that is the type that came with my instrument.

As I picked up each of the instruments to remove it from its case, I gave it a gentle twisting shake to check the suspension of its meter pointer. Both pointers swung back and forth freely on their bearings – definitely a good sign.

◆ Inside the Instruments

The condition of the interior of the Senior Voltohmist proved to be a pleasant surprise. Unlike the exterior it was super clean and looked virtually untouched. There was no sign of burned or charred components or of something I've learned to dread when opening the cases of old multimeters: composition resistors jury-rigged to replace burned-out precision wire wounds.

Another plus was that I did *not* find an ancient 1.5-volt cell (used to power the ohmmeter) corroding inside the case. At some time in the fairly recent past, the cell had been replaced by a modern "C"-size Mallory Duracell soldered to the original leads. Just for the heck of it I slipped the Duracell into my Radio Shack battery tester; it was dead as a doornail – as expected. However, there was no sign of corrosion or leakage.

Both of the tubes in the unit (a 6AL5 and a 12AU7) tested good. Examining the paper capacitors used in this instrument, I saw that, except for one wax-covered unit (a type that is always highly suspect), all were molded plastic types.

The Junior Voltohmist instrument had a similarly clean interior with no signs of previous trauma or butchery. It also had a Mallory Duracell ("D" size) soldered to the battery leads in place of the original. This one pegged the needle on my tester, though – showing plenty of life. Someone had been here very recently!

The power supply electrolytic capacitor had been replaced with a modern unit of the proper capacity but with a 450-volt rating instead of the specified 250 volts. The paper capacitor complement included two wax-covered units. The tubes (a 12AL5 and a 12AU7) tested fine.



Interior of Senior Voltohmist. The large wax-coated paper capacitor (at center of bottom compartment) will be replaced, along with the power supply electrolytic (right center, top).

Before wrapping up this examination session, I needed to make sure the power transformers in both units were ok. These specialized parts would be very difficult to replace, and it would be a waste of time to undertake any restoration work on a unit where the transformer is burned out. When checking a power transformer in a piece of vintage apparatus that has not yet been recapped, it's safer (in case of leaky or shorted capacitors) to disable the plate

voltage supply if possible.

In the Voltohmist Junior, half of the 12AL5 tube is used as the power supply rectifier, so all I had to do was pull it. Powering up the instrument, I could see that the other tube (the 12AU7) was lighting up, so the transformer's filament winding was ok. And I was able to measure about 150 volts of a.c. – which is normal for this unit – across the high-voltage winding. In the Voltohmist Senior, rectification is handled by a semiconductor diode, so disabling the B-plus wasn't convenient. I decided to take a chance, turn the unit on briefly and check for plate voltage. It was there, and both tubes lit up – proving that transformer was ok.

◆ The Restoration Plan

All of the wax-covered paper capacitors are slated for replacement. These old wax-covered caps are quite susceptible to water vapor intrusion and definitely are not trustworthy. The power-supply electrolytic capacitors in both units will also be replaced. Electrolytics have a limited lifetime no matter how they are encased. Older ones may fall open and simply lose their filtering action, or they may short and possibly burn out the power transformer. Even though the Junior Voltohmist capacitor is new, it will be replaced with one having the proper voltage rating because electrolytics do not develop their rated capacity unless operated near their rated voltage.

Of course it goes without saying that we will replace the ohmmeter cell in the Senior Voltohmist instrument and give the outside a thorough cleaning. We'll probably also repaint the case in a shade of gray similar to the original, though I know the new paint won't have the original hammertone finish. Finally, we'll do our best to polish the few scratches out of the plastic meter face. Brasso metal polish usually does a good job on this kind of thing. I'm not sure yet what should be done about the broken case of the Junior Voltohmist test probe.

We should be able to report on the successful completion of all this work next month, when we should also be able to test and recalibrate both instruments – wrapping up our VTVM project.



Interior of Junior Voltohmist. Ohmmeter battery, shown at left of meter movement, is normally stowed in a clip inside back cover.

◆ New From Lindsay Publications

The Impoverished Radio Experimenter Volume 3

5 1/2" X 8 1/2"; Soft Cover; 48 Pages; \$6.95 plus \$1.25 shipping.
Lindsay publications, Inc., Bradley, IL 60901; 815/935-5353

The premise of the *Impoverished Radio Experimenter* series is to encourage reader to build vacuum tube radios and electronics equipment without spending a mint for vintage components or specialized test equipment. The first two volumes have been reviewed in previous columns, but full information will be found on Lindsay's web site <http://www.lindsaybks.com>.

The first article in the book describes how to build something that few of us imagined could be put together in a basement workshop: an impedance bridge. With it, the experimenter can (among other things) easily measure the inductance capacitance, or resistance of salvaged components. Other sections of the book provide more information on building a solid-state audio amplifier (sometimes necessary to amplify a weak bridge tone) as well as using the bridge to make measurements and construct audio filters.

Also crammed into this little volume are articles on building an audio test oscillator, fitting knobs with transparent pointers, building wood radio cabinets with a retro look, constructing variable capacitors, regenerative receivers and a laboratory power supply, and much more.

This friendly and chatty little book is worth its price for the impedance bridge information alone. It's highly recommended.

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Making Your Own Antenna Feedlines

Commercially-built equipment is readily available for most of our radio needs, but it is educational and useful to construct some of our own gear. And, nicely enough, we usually save a buck or two in the process. This month let's talk about building our own antenna feedlines.

◆ Function of Feedlines

Feedlines, also known as "transmission lines," route RF energy from its source to a circuit (load) that will utilize that energy. One example is routing a received-signal from an antenna (the source) to a receiver's antenna-input circuit (the load). Another common feedline application is routing RF from a transmitter's output (source) circuit to an antenna (load) where it will be radiated into space. Usually we want our feedlines to transfer the maximum possible energy from the source to the load, and lose as little energy as possible along the way.

If the load is an antenna, radiation from the feedline wastes power by sending it in unintended directions; this distorts the antenna system's radiation pattern. During reception feedline pickup of signals can distort the antenna system's reception pattern. And, whereas the antenna is usually located away from electrical-noise fields caused by electrical appliances in the building where the receiver is housed, the feedline often must pass through these noise fields on its path between the antenna and receiver. In such situations minimizing electrical noise pickup by the feedline can be very important, espe-

cially for weak-signal reception.

Feedline radiation and reception (leakage) levels vary greatly between different types of line. Well-made coaxial cable (fig. 1A) has very little leakage. This is because the signal path is within the cable, and this path is shielded by the cable's outer conductor. With open-wire (fig. 1B, 1C & 1D) line there can be significant leakage by the line. This is especially true of the one-wire line, and is more true of the two-wire line than four-wire line.

With multiple conductors such leakage decreases as the conductors are positioned closer to each other. Some multiwire designs other than those shown reduce leakage by shielding their "center-conductor" wire between two to four "outer conductor" wires. With both multi-wire and single-wire feedlines, leakage by the line can be reduced by orienting the line perpendicular to the antenna's length as it leaves the antenna feedpoint.

◆ Some Home-Brew Feedlines:

The most common home-brewed feedline is a two-conductor, open-wire line (fig. 1C). Old-timers sometimes simply used a "twisted pair" of wires (or the type of cord then used to connect electrical lamps to the household wiring), as low-impedance two-wire RF feedline. This line has fairly high loss, but at the lower end of the HF band and below, this line could be acceptable in some situations. Today, with low-loss RF feedline readily available, this practice is no longer common.

It is convenient if the feedline's impedance matches the impedances of the source and load to which the line is connected. But, as we saw last month, mismatches can be corrected with various circuits. On the other hand, the feedpoint impedance of a halfwave antenna, and many other linear antennas, varies depending on where the antenna feedpoint is placed. With these antennas the feedline and antenna can be impedance matched by picking the right place on the antenna for the feedpoint. For a halfwave dipole the feedpoint impedance varies from very high at each end of the antenna to low at its middle. It is often possible to select a point along the antenna to provide a feedpoint whose impedance will match that of the line. The Windom shown in fig 1B provides some degree of feedline-antenna match using an off-center feedpoint. Various versions of the Windom utilize either the single-wire, two-wire, or coax feedline.

Sometimes one end of a random-length antenna is simply run into the operating room and connected to the receiver. In a sense, then the end of the antenna is utilized as a single-wire feedline. Depending on the height and length of the antenna and the frequencies utilized, the impedance of this kind of feedpoint can vary considerably. For general monitoring below about 20 or 30 MHz, this kind of receiving-antenna system usually gives decent performance despite the mismatches. For transmitting an antenna matching device would be needed.

The 17th edition, and probably other editions, of the *ARRL Antenna Book* discuss an interesting, single-wire feedline called a "G-line" (fig. 1E). This line's very low loss makes it useful for long runs (over about 100 ft, or 30 m) in the UHF and microwave bands. Coaxial cable feeds at each end launch or receive the signal using cone-shaped conductors which are essentially funnel-like extensions of the coax's shield. The single wire is essentially an extension of the coax's inner conductor. The launcher cones should be at least three wavelengths long. Heavy, insulated wire, such as number 14 vinyl covered, is recommended for the line. This line should be run straight or curved slowly if at all.

◆ Let's Build Some Feedline Coaxial Lines:

Making significant lengths of coaxial cable is not usually practical. However, at VHF and higher frequencies, short sections such as are used for quarter-wave matching sections are sometimes practical. The outer conductor could be metal tubing, with wire or smaller tubing for

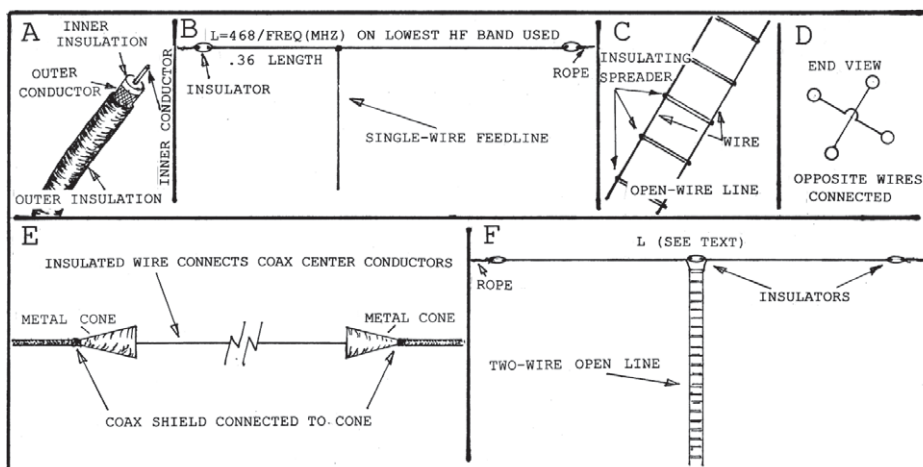


Fig. 1. Coaxial cable (A), single-conductor open line with Windom antenna (B), two-conductor, open line (C), diagram of four-conductor, open line (D), G-line (E), and the Old-Timer's Antenna (F).

This Month's Interesting Antenna-Related Web site:

Much good information on making transmission lines is found on Cebick's

<http://www.cebik.com/par.html>

For a detailed definition of transmission lines go to

<http://www.its.bldr.doc.gov/fs-1037/dir-038/5565.htm>

For a handy and interesting transmission-line calculator go to

<http://fermi.la.asu.edu/w9cf/tran/>

the center conductor. Disk spacers can be made from insulating material, such as plastic, to hold the center conductor in place.

For these air-insulated coaxial lines:

$$Z = 138 \log D/d$$

Z is the line's characteristic impedance, D is the inner diameter of the outer conductor, d is the outer diameter of the inner conductor. For example, if D/d is .556 in/.2 in then Z is 61.3 ohms. Incidentally, this is the impedance to use for a quarterwave transformer to match 75 and 50 ohms.

Open-wire Lines:

The most practical feedline for home construction (and, nicely enough, also the lowest-loss line) is two-wire, open feedline. This can be made using almost any bare or enameled copper or aluminum wire strong enough to stand the usage you intend for it. Insulating material such as plastic, fiberglass, or dry, varnished, wooden dowels can serve as spacers.

For air-insulated, two-wire lines using spacers:

$$Z = 276 \log 2S/d$$

Z is the line's characteristic impedance, s is the spacing between the centers of the conductors, and d is the diameter of the conductors. For example, if S = 6 in, and d = .08 in, then Z = essentially 600 ohms, a recommended value for the feedline for the Old Timer's Antenna (fig. 1F, also featured in the August 2000 *Antenna Topics* column).

For single-wire lines:

$$Z = 138 \log 4h/d$$

Here h is the height of the line above earth, and d is the line diameter.

An Antenna for the Feedline:

The Old-Timers all-band antenna (fig. 1F) makes good use of two-wire, open feedline. Feedline impedances of from 300 to 600 ohms have successfully been used with this antenna.

This antenna should be at least a quarter wavelength long at its lowest operating frequency. A quarter wavelength is determined by: Length (feet) = 234/frequency in MHz, or Length (meters) = 71.3/frequency in MHz

For example, a quarterwave at 10 MHz would be 23.4 feet.

An antenna tuner or appropriate balun could be used to match the high-impedance of the line to the low impedance of today's receivers or transmitters. For receive-only use on HF and lower frequencies this matching is not strictly necessary.

RADIO RIDDLES

Last Month:

I asked: "Coax feedline can be manufactured with any of a wide variety of impedances. Why standardize on 50-ohms for radio applications, 75-ohms for CATV, and other values for other applications?"

Well, as described above, a ratio of inner and outer conductor diameters in coax determines the impedance of the coax. And the ratio of conductor diameters which will carry maximum power is different from the ratio of diameters of a feedline that has the lowest signal loss. Lowest loss is somewhere around 75-ohms impedance, whereas the ratio that provides maximum power-handling capability is around 30 ohms impedance. Thus, in situations where very-low signal-loss is needed, such as CATV signal distribution, the higher-impedance 75-ohm line is preferred. On the other hand, the 50-ohm line standard used in radio is a compromise between low signal-loss and maximum power-handling capability.

This Month:

What single-wire antenna is considered essentially a very leaky, two-conductor feedline which utilizes the earth as one of its conductors? Hint: This is a highly directional, very long, low-noise antenna.

You'll find an answer for this month's riddle, another interesting, antenna-related web site, and much more in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.



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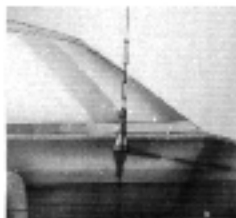
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Tk120 Software for the Yaesu VR-120

The Yaesu VR-120 is a shirt pocket sized receiver which tunes AM and FM signals up to 1300 MHz (reviewed in July 2001 *MT*).

Programming large numbers of frequencies and channel labels using a keypad can be tedious, so many prefer to program radios using software. As VR-120 owner Gary Kinsman wrote, "A small scanner with no numeric keypad almost requires programming software." The problem is that nobody offers VR-120 software, and if they did, Linux and Mac users would likely be ignored.

One radio software company announced they would be selling VR-120 cloning software, but disappointed VR-120 owners by canceling the project 7 months later.

To fill the void, I wrote the tk120 software utility to permit Linux and MacOS X fans to program their VR-120s. Tk120 also works well with Windows 98, Windows 2000, and Windows XP and I'm looking for beta testers willing to try it on their MacOS X systems. You can download tk120 from my web page at <http://members.core.com/~parnass>.

Tk120 lets you change the VR-120's search limits, Preset frequencies, Dual Watch settings, and Skip frequencies. As a bonus, you can change the band plan which associates detection mode with frequency range, a flexibility not afforded using the radio's keypad controls.

To change the memory channels, you export them to a csv (comma-separated values) file, then use a spreadsheet or text editor program to make the alterations. Then, you import the updated csv file into tk120 and write the information to your radio.

◆ Preparation

Before using tk120, you must connect your VR-120 to your computer's serial port using a suitable level converter cable. You can build a converter cable or buy a CT29A cable from RT Systems, P.O. Box 12188, Huntsville, AL 35815, telephone 1-800-750-9689 or visit

their web page at <http://www.rtsars.com>.

Before using tk120 or any software with a portable receiver, make sure your radio's batteries are sufficiently charged. Low battery voltage interferes with the cloning process.

◆ Sharing with other VR-120 Owners

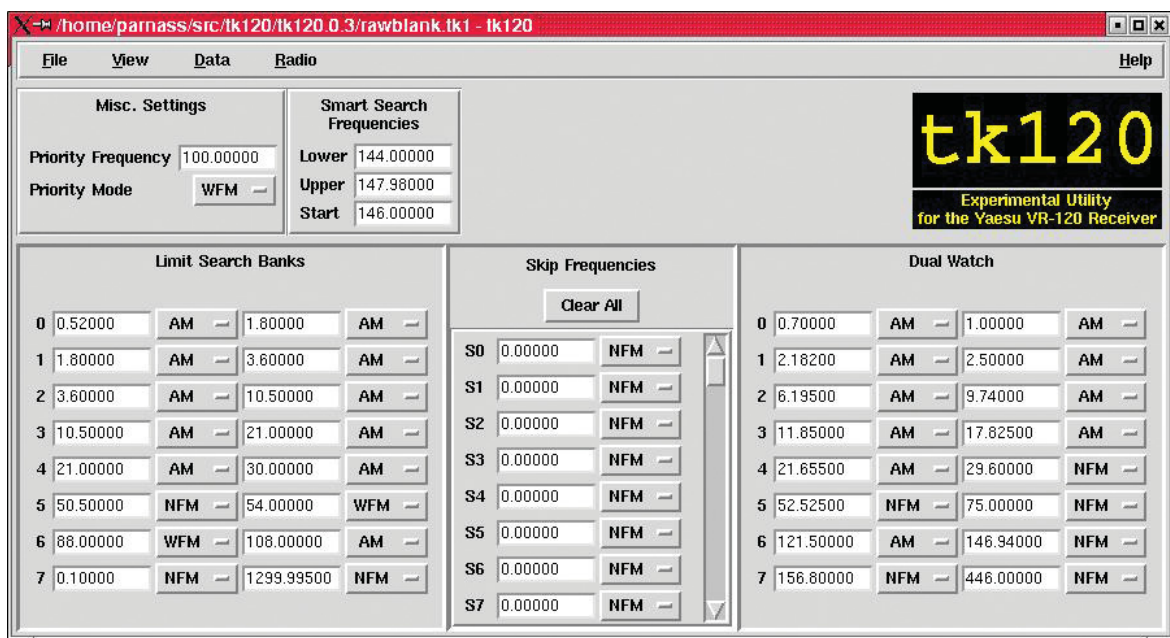
Developing tk120 was a challenge because I don't possess a VR-120. I returned the sample VR-120 after completing the *MT* review.

VR-120 owners Russell Hall and Gary Kinsman volunteered to help test tk120.

I started out by reusing my tk500 software (designed for the VR-500). Each day, I made software changes and sent the latest version to Russell, along with one or more tests to run. Gary ordered an RT Systems cable and commenced testing when it arrived. Russell and Gary dutifully tested the experimental software with their receivers and mailed back the results. Torsten Grochowski joined the testing later with a European VR-120.

We converged upon a working program 11 days later.

Writing software for a radio you don't have can challenge your patience. You get an exciting idea for a new feature but you can't try it right away. Instead you must rely upon others to test it and await the results. On the other hand, working with people who share



Preset Memories			Auto Band (Band Plan)		
0	0.52000	AM	1	0.2850	AM 5
1	1.80000	AM	2	0.5200	AM 10
2	3.60000	AM	3	1.7100	AM 5
3	7.00000	AM	4	50.5000	NFM 5
4	10.50000	AM	5	54.0000	WFM 50
5	21.00000	AM	6	108.0000	AM 25
6	50.50000	NFM	7	142.0000	NFM 12.5
7	88.00000	WFM	8	144.0000	NFM 5
8	144.00000	NFM	9	148.0000	NFM 12.5
9	430.00000	NFM	10	156.0000	NFM 25
10	1240.00000	NFM	11	157.4500	NFM 12.5

your goal and have common interests is very gratifying. They own and use the radios and can make valuable suggestions for improving the software.

There are two Yahoo email groups dedicated to the VR-120: <http://groups.yahoo.com/group/YAESUVR120> and <http://groups.yahoo.com/group/YaesuVR-120>

They provide a good forum for swapping tips and frequency files.

Tk120 Memory Channels				
252	462.61250	NFM	p	FRS 3
253	462.63750	NFM	p	FRS 4
254	462.68750	NFM		FRS 5
255	462.71250	NFM		FRS 6
256	467.56250	NFM	p	FRS 7
257	467.58750	NFM		FRS 8
258	467.61250	NFM		FRS 9
259	467.63750	NFM		FRS10
260	467.66250	NFM	p	FRS11
261	467.68750	NFM	p	FRS12
262	467.71250	NFM	p	FRS13
263	162.45000	NFM		NOAA
----- BANK 3 -----				
300	127.22500	AM	p	
301	133.22500	AM	p	
302	136.80000	AM	p	
303	134.62500	AM	p	
304	121.50000	AM	p	GUARD
----- BANK 4 -----				
400	42.02000	NFM	p	MSHP
401	42.06000	NFM	p	MSHP B
402	42.12000	NFM	p	MSHP
403	42.22000	NFM	p	MSHP
404	42.32000	NFM		MSHP
405	42.38000	NFM	p	MSHP
406	153.89000	NFM	p	KFD
407	154.07000	NFM	p	KC FD
408	154.13000	NFM		HFD
409	154.14500	NFM	p	SHBYVL
410	154.17500	NFM	p	

◆ For Programmers Only

Tk120 is written in Tcl/Tk, an excellent scripting language for creating graphical programs which work on several operating systems. You can learn more about Tcl/Tk at <http://www.tcltk.com> and <http://mini.net/tcl/0.html>.

Tk120 communicates with the VR-120 through a serial port using these parameters: 9600 bps, even parity, 8 data bits, and 1 stop bit. Tk120 uses blocking IO, so it can "hang" if the radio becomes disconnected accidentally during a data transfer.

The VR-120 sends and receives binary data, except for the opening message and memory channel labels.

Cloning software operates differently from control software in a few ways. Radio manufacturers usually document the interface commands used for radio control. You develop control software by sending the commands (e.g., set VFO frequency to 162.55) to the radio, optionally reading a status, then observing whether the radio behaves as documented.

◆ Radio Cloning Software

In radio to radio cloning, a cable connects two radios together and, after a "handshake," data is sent directly from one radio the other. A computer executing cloning software must appear to the radio as merely another radio. Receiver manufacturers typically don't make cloning interface details public so developing cloning software requires significant experimentation to answer these questions:

What is the procedure and syntax for requesting a download and upload of the radio's memory image?

How should the memory image be interpreted to translate it into individual settings?

To read the radio's memory image, the cloning software sends a message to the radio requesting a transfer. The radio responds with in-

formation which identifies its model and firmware version. The cloning software answers by sending an acknowledgement.

Then the radio sends a sequence of messages containing the radio's operating parameters. After transmitting all the settings data, the radio sends a special message signifying it is finished. At that point, the software must respond with an acknowledgement and the dialog ends.

The exact message format varies depending on brand and model of radio, but protocols commonly employ acknowledgements and checksums. The cloning software must acknowledge each message within a short time or the radio assumes there has been a disruption and cancels the transfer. Messages in both directions usually contain a checksum byte which is used by both the radio and computer to detect data transmission errors.

Tk120 assembles the VR-120 data messages into a 7680-byte long string, which represents a VR-120 memory image. Tk120 parses the image to extract the radio settings, stores the settings in internal variables, and displays them on the screen as widgets. A user can save the raw image in a disk file.

The process of writing a memory image back to the radio resembles reading, but in reverse order. First, the settings are checked for validity. Users are warned if they have specified frequencies which are censored in the USA version and out of band frequencies are identified as errors.

Tk120 then encodes the settings into the memory image string and sends a message to the radio telling it to prepare to receive the data messages. Tk120 waits for an acknowledgment, then sends the image string to the radio, one piece at a time, in a series of data messages. After sending the last data message, tk120 sends a special message signifying the end of the sequence and then awaits acknowledgement from the radio, which ends the dialog.

◆ What's Missing?

Tk120 is capable of programming the most important frequency, mode, and step size settings in USA and European VR-120 receivers. Future enhancement could include control over secondary settings, e.g., memory bank links, display illumination, keypad beep tone, etc.

Tk120 is simple to use but has no instruction manual or user guide documentation. Someone want to volunteer to write one?

Longwave Resources

✓ **Sounds of Longwave** 60-minute Audio Cassette featuring WWVB, Omega, Whistlers, Beacons, European Broadcasters, and more! \$11.95 postpaid

✓ **The BeaconFinder** A 65-page guide listing Frequency, ID and Location for hundreds of LF beacons and utility stations. Covers 0-530 kHz. \$11.95 postpaid

Kevin Carey
P.O. Box 56, W. Bloomfield, NY 14585

AirNav's Decoder Programs: ACARS & SelCal

Last month we looked at one of AirNav's new products: AirNav Internet Lite. For an overview of the new AirNav Version 4, check out *Plane Talk* on page 68 of this issue. In today's column we will take a look at the other two AirNav programs: AirNav ACARS Decoder 1.1 and SelCal Decoder 1.1.

The interesting thing about these two decoder programs is that neither requires external hardware. The audio output of the receiver is connected to the input of a computer's sound card. It's a great idea, but do they work? Let's first try the ACARS decoder.

What is ACARS?

Although we have covered ACARS programs in the past, it might be a good idea to start at the beginning. As the HELP File of AirNav ACARS simply states, "ACARS (Aircraft Communication Addressing and Reporting System) is a digital data link system transmitted via VHF radio which allows airline flight operations departments to communicate with the various aircraft in their fleet." Well, that succinctly sums up the purpose of ACARS, although *MT* readers are aware that ARINC (Aeronautical Radio Incorporated) has recently begun using ACARS on shortwave frequencies as well.

ACARS is a digital signal broadcast on the VHF airband using the following frequencies:

129.125	Additional channel for USA & Canada
130.025	Secondary channel for USA and Canada
130.450	Additional channel for USA & Canada
131.125	Additional channel for USA
131.525	European secondary
131.550	Primary channel worldwide
131.725	Primary channel in Europe
136.700	Additional channel for USA
136.800	Additional channel for USA
136.900	European secondary
136.925	ARINC European Channel

Although this is a software-intensive program, its computer requirements are very modest. I ran it on a Pentium I, 233 MHz, with 32 MEG of RAM, running Windows 95. Of course, the computer is equipped with a sound card and has a small 10 Gig hard drive. The old reliable Yaesu FRG-9600, attached to a ground plane antenna, was used as the receiver. The front panel audio out was connected to the computer's sound card line-in. That's it. No other hardware is required.

A demo version of the software can be downloaded from AirNav's website. The demo version

is limited to 30 minutes of operation and does not allow saving of received information. The download results in a Zip file, which was quickly and easily unzipped and installed using WinZip. The resulting program takes 1.2 Meg of hard drive space. Additional drive space is required for saved ACARS message logs.

When you pay the \$49.95 for the full registered version you will be emailed a user name, personal ID and registration code. Once this information is entered into a dropdown menu all restrictions are lifted.

K.I.S.S. Approach

All it took to start receiving ACARS data was a careful setting of the volume control on the FRG-9600. The horizontal bar graph at the lower right of the screen gives the user a guide to the correct volume control setting. However, it was still a touchy procedure in order to maximize clearly decoded transmissions.

The user can select three different screens (and their associated functions): Text Log, Live ACARS Grid and Flight List Grid. Function selection is performed by clicking the tab name of the function near the top of the display.

The Text Log screen of the ACARS decoder, Figure 1, shows how simply AirNav has designed the user interface. Figure 1 displays actual off-air ACARS data from the FRG-9600. The Text Log from United Airlines flight 0946 (UA0946) is a good example of a standard ACARS message. This transmission is from a Boeing 772 (B772) that is sending information on engine control units. Additional information can also be seen in this message numbered C54B (Msg no: C54B).

Live ACARS Grid

Figure 2 shows the Live ACARS Grid screen,

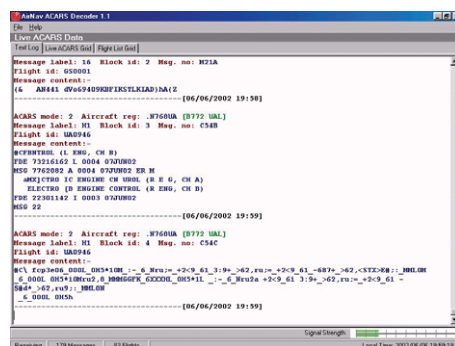


Figure 1 AirNav's ACARS Decoder - Text Log Screen

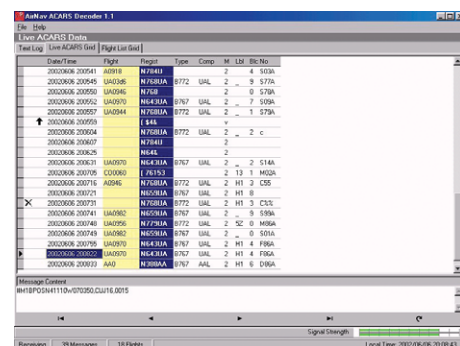


Figure 2 Live ACARS Grid Screen

which displays a summary of the decoded transmissions. This list is sorted by time of intercept and is a great way to quickly scan the traffic. The ACARS message on the line, which is highlighted, is displayed at the bottom of the screen. The arrows at the bottom of the display are used to move through the list.

It's fascinating to watch as new transmissions are received and the screen is updated.

Flight List Grid Screen

The program's HELP file describes this screen "... each line is a different flight being received. The Ct column shows the number of messages received for each flight."

In Figure 3, Flight List Grid, you can see that the routing of flights AF0095 and AA0108 are displayed. The airport identifiers of the takeoff and land airports are displayed. Again, the message of the highlighted flight is displayed at the bottom of the display.

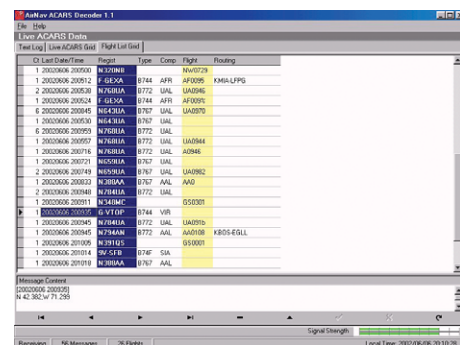


Figure 3 Flight List Grid Screen

Information Is Power!

AirNav's ACARS Decoder software includes a number of databases accessed via dropdown

menus. These include: Aircraft (registration/aircraft/company/CN), Flight Number (callsign/routing) and Airline (aircraft/threecode/twocode/callsign). The user can easily update the databases by simply overwriting the data or adding data to blank fields. This makes database maintenance very straightforward and easy.

With AirNav Suite 4 installed, aircraft and flight data will be imported from the AirNav Suite 4 databases.

Give It A Try

AirNav ACARS Decoder 1.1 ran smoothly and never crashed. It has a number of other features that I encourage anyone interested in ACARS to investigate. Your time will be well spent.

♦ AirNav SelCal 1.1

SelCal is a tone access coding method used by commercial airliners flying transcontinental air routes. In other words, all aircraft receivers remain squelched, except the one being called. This allows Selective Calling of aircraft while not disturbing flight crews of other aircraft. These tones are transmitted on shortwave (HF) frequencies using upper side band modulation.

Although I have heard SelCal tones for more decades than I care to remember, this is the first SelCal decoder program that I have used.

The AirNav SelCal Decoder has the same modest computer requirements of the AirNav ACARS Decoder (see above). Again, as in the other AirNav decoder, no external hardware is required. The receiver interface is via the computer's sound card. An ICOM R71A, using a long wire was used as the receiving system.

Downloading, installation and registration was a repeat of what we just did with the ACARS Decoder. It was just as easy and without a problem. Registration is also \$49.95 for AirNav SelCal Decoder (see below for website info).

Easy As Pie

In operation, AirNav SelCal Decoder is even simpler to use than its ACARS brother. Figure 4 shows you just about the whole ball of wax. The volume of the receiver is adjusted using the graphical display at the top of the screen.

However, on shortwave, with its wildly varied signal strengths, the volume setting was a bit trickier than the VHF ACARS signals. It seemed that I could hear more tones than the program could decode. So much for the sensitivity of the human ear! Figure 4 shows actual off-air SelCal decodes.

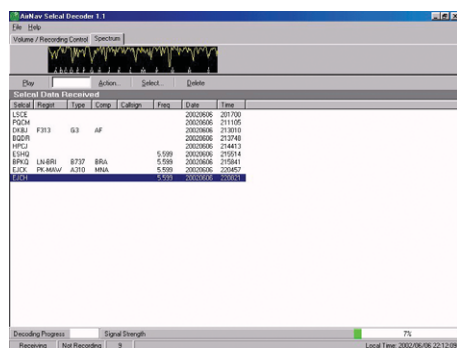


Figure 4 AirNav's SelCal Decoder 1.1 Main Screen

Seeing Is Believing

In addition to displaying the four SelCal characters, additional information is displayed if they are in the AirNav program. This includes database aircraft registration, type, company, callsign, date and time of reception.

The same easy user interface to the SelCal database makes updates and addition very simple. Database manipulation is via the buttons below the volume graph.

A useful database field is Frequency. The user has to manually input the frequency of the transmission, but it is nice to have it included in the database. As you can see, most of the SelCals received were on 5599 kHz.

The program allows you to save audio recording of the SelCal tones automatically. This feature worked very well and provided a unique "log" of the intercepts.

Go For It!

If you are into aircraft monitoring, then you should definitely try the AirNav SelCal Decoder

demo. Check it out at the AirNav Web page: <http://www.airnavsystems.com> Or, contact AirNav via Email at support@airnavsystems.com

♦ One Nagging Problem

Recently, every time I turn on my computer it wants to immediately access the Internet. My Dialer screen comes up and I have to hit Cancel a number of times before it leaves me alone!

To tell the truth, I'm not sure if this is AirNav's programs doing, or some other program that I may have loaded around the same time. But I will tell you this ... it's damned annoying! It could be a program which is automatically searching for an updated version on a website. But, it's still a pain. If you get the same situation after loading either of these programs, let me know.

Even with that one possible exception, I had great fun with all the AirNav products. I suggest you at least try their demos.

Till next time, make sure you know to whom you are connecting BEFORE you make the connection! That's good Internet, personal, and business advice.

Outer Limits continued from page 71

Radio Naranja- This new Spanish Europirate, using 25615 kHz on some Sundays around 0800 UTC has been heard by some European DXers. (Uses radionaranja@hotmail.com e-mail)

Radio Nonsense- Although its operator, Joe Mama, is deceased, tapes of this classic pirate still reappear from time to time. (Belfast announced, but replies uncertain)

Rizzo Radio Madonna- The latest in a crop of pirates with Philadelphia references in their programming has not been widely heard, probably because of their unlikely frequency of 27555 kHz. (None)

Radio Urantia Worldwide- Like the fake Radio Metallica, listed above, this new one is a Dr. Tornado parody. (None)

Seattle Free Radio- This new one has been heard primarily by DXers in western North America with a format of parody sketches and pirate advocacy. (Uses Seattlefreeradio@yahoo.com e-mail)

Swinging Radio England- A press release from this Europirate announced that the station has been closed down.

United Patriot Militia Bingo- Despite the demise of its KSMR target, this clandestine parody pirate remains quite active, featuring a feminist soldier praising Yahweh in a sexy voice, as well as imaginary coverage of Steve Anderson's flight from law enforcement. (Merlin)

Voice of the Angry Bastard- Their identification remains misleading, since their shows are dominated by calm music and non-controversial remarks by the announcer. (Belfast)

Voice of the New World Order- They claim to be transmitting from New York City with newscaster Bill Burger, and their QSLs to some lucky DXers indicate at least a programming format emphasizing the United Nations, which allegedly polices the New World Order. Lee Silvi's QSL from them had a UN flag at the top and a Steve Anderson wanted poster at the bottom. (Uses vonwoun@yahoo.com e-mail)

Voice of Laryngitis- Sportscaster Bull Bruiser has been reassigned in their new shows (see above) to duty in the mobile station news van. He's been looking for aliens in Area 52 instead of the more widely publicized Area 51. (Belfast)

WAIR- The news here is that Harald Kuhl heard them in Germany with a good signal that he presumes was from a European relay. Some North American pirates have relay deals like this that will make them audible outside North America. (Elkhorn)

WBZO- This relatively new station pokes fun at certain DXers, rather than DXers as a whole. It's been showing up on the pirate bands on an erratic basis. (None)

WHYP- Their recent sports news included coverage of the third annual James Brownyard memorial Croquet Tournament, but their Lake Erie weather and pirate advocacy format survives, including ads for a Steve Anderson ac-

tion figure doll. (Providence)

WMFQ- Their call letters still stand for promotion of QSLs, but most of their programming is rock music. (Providence)

WPN- It's hard to say if this is a return to the air of the veteran World Parody Network, or if this is a new one with crude sexual humor and non-rock music. (Huntsville)

♦ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses: PO Box 1, Belfast, NY 14711; PO Box 28413, Providence, RI 02908; PO Box 69, Elkhorn, NE 68022; PO Box 11522, Huntsville, AL 15814; PO Box 293, Merlin, Ontario N0P 1W0, Canada; and PO Box 663, 7900ar Hoogeveen, the Netherlands. Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletins for sending pirate loggings with a hope that pirates might QSL them remain *The ACE* (via Belfast) and the e-mailed *Free Radio Weekly* newsletter, still free to contributors via yukon@tm.net.

♦ Thanks

Your loggings and news are always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: Jerry Berg, Lexington, MA; Ralph Brandi, Tinton Falls, NJ; Rich D'Angelo, Wyomissing, PA; Harold Frodge, Midland, MI; William Hassig, Mount Prospect, IL; Harry Helms, Ridgecrest, CA; Harald Kuhl, Germany; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Bill McClintock, Avon Lake, OH; Lee Reynolds, Leppster, NH; Mike Roth; Zeke Russell, Williams, AZ; Martin Schoech, Merseburg, Germany; Lee Silvi, Mentor, OH; Bud Stacey, Setsuma, AL; D. J. Stevie, Basel, Switzerland; Niel Wolfish, Toronto, Ontario, and Joe Kenneth Wood, Gray, TN.

AOR LA350 Active Loop Antenna

By Bob Grove

AOR has just released a wide-frequency-coverage loop antenna system for indoor reception of long wave, medium wave, and short wave signals. While most competitive models have very restrictive frequency ranges (most commonly, medium wave only), the new LA350 will cover 200 kHz-30 MHz.

Currently supplied with loops for 3-9 and 9-30 MHz, the company indicates that loops for 200-540 kHz and 540-1700 kHz will be available shortly.

❖ So why a loop?

Most listeners have found that an outdoor wire antenna is perfectly suitable for the vast majority of medium wave and short wave applications, but there are times when co-channel interference prevents monitoring stations on the same frequency.

The ability to separate two interfering stations can't be done with the receiver since they occupy the same frequency; a means of changing the antenna's direction is necessary.

A loop antenna exhibits a bi-directional (figure 8) pattern; by rotating the loop, you can either choose the station you want from a particular compass direction, or null out (reduce the strength of) the interfering station.

Of course an outdoor wire has substantially larger aperture (signal pickup size), but preamplification can substantially boost signal levels intercepted by a smaller antenna like the indoor loop.

Utilizing an internal 13.5 dB gain amplifier with an impressive +30 dBm third-order intercept, the pattern is quite sharp, and the frequency-tunable amplifier offers good selectivity.

Of particular note is the high third-order intercept (IP3). This is a measure of an amplifier's ability to withstand strong signal levels without generating spurious signals of its own ("intermod"). The LA350's +30 dBm IP3 is outstanding.

The loop is enclosed in a rigid aluminum Faraday shield to reduce pattern-distorting capacitance effects from nearby conductive objects, including the operator's own hand while turning the loop.

While many unshielded loops are on the market, their patterns are often unbalanced by the proximity of conductive surfaces. Our on-air test verified a sharp, symmetrical loop pattern which easily discriminated between desired

signal paths and ambient noise sources, as well as separating incoming co-channel signals.

The frequency control revealed high Q, a measure of tuning selectivity. This is useful in preventing receiver overload from off-frequency powerhouses which can cause intermod in the companion receiver.



The loop is affixed to a conventional 1/4-inch audio plug which is inserted into the host jack on the top of the control box, allowing it to swivel to any horizontal direction.

Power is supplied by a 12 volt wall adaptor (included). For those stalwart SWLs who want total isolation from the hum of AC power grids, a battery pack may be substituted.

A 20-inch BNC/BNC coax interconnect cable is included; this will require the after-market purchase of a suitable adaptor for virtually any receiver external antenna connector.

The AOR LA350 Active Loop Antenna with 3-30 MHz coverage is available for \$299.95 from Grove Enterprises (1-800-438-8155 or visit <http://www.grove-ent.com>); it is also available from other MT advertisers.

❖ ZAP Model 180 Electric Field Meter

There are quite a few pocket testers for electromagnetic energy, but this one actually has the look and feel of a professional test instrument.



Designed to detect electromagnetic emanations from a large number of sources (microwave ovens, hidden transmitters, computer equipment, wireless phones, amateur and commercial two-way radios, etc.), the ZAP 180 boasts a wide frequency coverage of 10-4500 MHz (4.5 GHz).

For invisible applications, the unit can be kept in a pocket and a vibrator-alert mode can be selected to notify the user of a nearby transmitting device.

Weak signals are clearly detected at a respectable distance using the linear scale, while snapping the mode switch to a logarithmic scale prepares for detection of much stronger signals. A large meter provides the capability of comparing relative signal levels as well as signal locating.

❖ So how does it perform?

Obviously, holding a clever little instrument like the 180 in your hand is too much of a temptation, especially when you're standing near electronic equipment.

Setting the mode switch to linear – the most sensitive, the radiation from the CRT monitor was immediately detectable in front of the screen. Our experience from past tests showed that it wasn't emitting a lethal dose!

My two-meter mobile rig has a 50-watt output, so that test was easy.

Interestingly, a test I had never tried before was quite revealing. While sitting in the car, a fair amount of sensitivity was required to trigger the little Zap, but outside the car, I could walk 40-50 feet away and still get a reading. Apparently, having a roof-mounted mobile antenna provides two measures of protection: The metal of the roof not only directs the signal pattern horizontally (over your head), but also provides a considerable measure of shielding from the radio frequency (RF) energy. Not a bad idea.

At home, the microwave oven invited experimentation. Sure enough, the brand-new microwave emitted measurable radiation for 20-30 feet from the oven door. I'm sure this meets government standards, as I've made similar measurements in the past with other ovens.

It became immediately apparent that the Zap 180 was suitable for a wide variety of applications, including "sweeping" for surreptitious transmitting devices ("bugs"); the red LED brilliantly reveals signal presence.

Worn inconspicuously under a coat or in a pocket while invoking the silent vibrator alarm, the device will immediately reveal the presence of a worn transmitter ("wire") for sensitive eavesdropping concerns during proprietary meetings.

Planning on buying a TV, computer, microwave, or other electronic appliance that could give cause for concern about electromagnetic radiation? Take the 180 along and compare the models before making the purchase.

Pruning a transmitting antenna for maximum output? The little Zap can let you know how various refinements result in increased signal.

Operating for up to 80 hours from a pair of AA alkaline cells (not included), the ZAP 180 is available for \$79.95 plus shipping from Grove Enterprises.

◆ More Scanner Whip Comparisons



In January we did a side-by-side comparison of several mobile whip antenna models regarding reception in the VHF/UHF range. The result was a clear endorsement of the Nil-Jon "Super M." Recently, a couple of additional whips came our way, so we decided to test them as well.

The Everhardt "Tiger" antenna line from Marvel Communications Co., Inc. (6000D Old Hemphill Rd., Ft. Worth, TX 76134) are well-made, helically-wound, fiberglass whips with standard 3/8 x 24 screw-stud bases intended for replacement purposes or suited for use with Everhardt's own line of bases.

Two antennas in particular, the MS-1 (24 inches, white) and MS-CB (48 inches, black, CB look-alike) are advertised

as scanner antennas. Since they are taller in profile than the Nil-Jon "Super M," we wondered how they would compare at lower frequencies as well as at VHF/UHF.

Our listening results, as disclosed by mounting the antennas on a car roof and viewing their relative received signal levels on our AVCOM PSA-65C spectrum analyzer, are shown below. Whips were separated physically by about four feet; after the first set of readings was taken, the whips were exchanged in position and the test repeated to reduce invalid results from phasing interaction or null spots in signal paths. Variations were averaged. This was an "A/B" test, and was not made under careful laboratory conditions; anomalies are possible. No attempt was made to analyze impedances for transmitting purposes.

Plus (+) values show superior performance, (-) values show reduced performance, and (0) values show identical performance; (NT) means not tested.

Freq. MHz	MS-CB	MS-1
1	+4	(NT)
10	-15	(NT)
15	0	(NT)
17	+10	(NT)
27/28	0	0
102	-22	-2
109	-23	-25
138	-4	(NT)
147	-8	-20
152	-5	-10
155	-4	(NT)
162	-5	0
285	0	0
412	0	0
463	0	0
573	-2	(NT)
730	0	0
860	-5	0
880	-5	0
953	-10	-20
987	0	0

◆ A Look at the Results

Although the Nil-Jon "Super-M" showed overall superior performance again, the only ranges where substantial differences in weak signal reception are likely were on VHF high band (144-174 MHz), and toward the high end of the UHF "microwave mobile" band (806-960 MHz). If mobile shortwave reception were important, the taller Everhardt MS-CB would be recommended. For overall VHF/UHF scanner reception, the Nil-Jon is still the standard of comparison.

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The BX1 will combine six speaker level audio input signals to one 2 1/2 watt speaker output - eliminating the need for an external speaker for each receiver or transceiver. The unit has a convenient front mounted mute switch to silence the output during needed quiet time. At the flip of the switch, the audio is restored. The front panel LED indicates muted or unmuted operation. Additionally, the BX1 solves the problem of the inadequate audio output of most scanners and transceivers. The BX1 boosts the inputs to a powerful 2 1/2 watts.

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Davis Instruments' Incredible Vantage Pro® Wireless Weather Station

Long-time readers of this column know that I have a “thing” about the weather. It affects our lives every single day, sometimes with catastrophic results. That’s why I recommend a Weather Radio receiver in every household that’s within range of a NOAA Weather Radio transmitter. NOAA weather radio is, without doubt, one of the better deals that we get for our tax dollars.

There are, however, significant limitations to Weather Radio. The foremost being that the observations being broadcast – windspeed, temperature, and so forth – are those from the local forecasting office. If you don’t live in the immediate vicinity of the forecasting office, depending upon a number of factors, conditions could be very different at your location.

So it was with great interest that I received an email from our Dauntless Editor that said, in essence, “There’s a fellow from Davis Instruments who wonders if you’d like to check out their new weather station.” It took me about two seconds to say yes, and a few days later Brown Santa (aka the UPS man) dropped off a couple of packages.

The first contained a sturdy galvanized steel tripod that would allow me to temporarily mount the station in my yard. The second contained the actual weather station, the Davis Instruments’ Vantage Pro wireless weather station.

There are two main pieces to the Vantage Pro. The first is an instrument package, called the “Integrated Sensor Suite,” that mounts outside. It contains sensors for temperature, humidity, rainfall, wind speed and wind direction. (The sensor for barometric pressure is actually located in the Vantage Pro console.) The module that contains the wind vane and anemometer can be separated from the instrument package for mounting at a separate location (high on a mast, for example) if desired. The instrument package also contains a small lithium battery and a solar panel that recharges it.

The second main piece of the Vantage Pro is the console, a plastic box with a large liquid crystal display that shows what’s going on with the weather station, and a whole lot more besides. The console can be run off house current, with the help of a wall wart transformer (supplied) or three “C” batteries.

It took me about an hour to put the weather station together. The tripod is

very straightforward, thanks in no small part to a very well written manual that never leaves the person doing the assembling at a loss for what to do next.

The writer of the manual for the Vantage Pro also deserves top marks. For example, before mounting the instrument package anywhere, the manual strongly suggests checking to make sure that the instrument package and the console are communicating with each other.

Commissioning the instrument package requires removing some plastic shields from the bottom, plugging in the lead from the wind vane/anemometer, and popping the lithium battery into its clip. You also have to remove the rain collector cone and cut a plastic cable tie to enable full operation of the rain gauge. Firing up the Vantage Pro console is as easy as inserting the three C alkaline cells (user supplied) and closing the hatch. Instantly, the instrument package begins sending data to the console. (If it doesn’t, there is a troubleshooting section in the manual.) During set-up there is an opportunity to enter your longitude, latitude, time, altitude, etc. to enable more detailed and localized reports.

❖ Data Collection and Analysis

Once the instrument package is reassembled and mounted somewhere outside with proper directional orientation, it just sits there collecting and relaying data. What really makes the Vantage Pro weather station fun is the console. As you would expect, it displays all the basic measurements from the instrument package, but it also will display a host of other values calculated from two or more of the measured parameters, such as dew point, heat index, wind chill, rain rate, and more.

There is also a lot of additional information collected and displayed by the console. For example, when the wind is really whipping through the trees, you can, of course, check the current wind speed. But you can also read the average wind speed for the last ten minutes and see a graphic representation of the average wind speed for each of the last 24 hours on a graph. Press the HI/LOW button, and you’ll see the high wind speed for each of the last 24 days, months, and years, along with time and date information. You can also check the detailed forecast message to see if the high winds are likely to continue (the station’s forecast algorithm takes barometric pressure, wind, temperature, and geographical location into account), and you can set an audible alarm to notify you whenever the wind speed reaches a given value.

You can also take advantage of similar graphs, highs and lows, and alarms for just about all other weather parameters. In all, there are 80 possible graphs and 70 possible alarms, and all this information is packed into a good-looking console that measures 9.5 inches x 6 inches x 1.5 inches. One of the coolest things about the console is that, when it’s running on battery power, you can tote it around the house with you. So whether you are in the basement, the bedroom, or the kitchen, you can instantly see what’s up with the weather at your location, not just what the NOAA is reporting from the nearest forecast office. It’s what SkyWarn Spotters call “ground truth.”

I give the Vantage Pro weather station my highest personal recommendation. At \$595, it is not cheap, but it is darn well worth it. A very cool option for the Vantage Pro is the WeatherLink comprehensive data logger and software package to link your weather station to your PC for colorful, customizable graphic displays. For more information about either, visit <http://www.davisnet.com> or call Davis Instruments at 1-800-678-3669





The MFJ-1020C Active Antenna

By Ken Reitz

Sometimes the places in which we live are not compatible with good short-wave reception. More and more places where external antennas aren't allowed are cropping up across the land and listeners are forced to compromise. There is, of course, no substitute for a great outdoor wire antenna, but one good candidate for a compromise antenna is MFJ's 1020C indoor tuned active SWL antenna which tunes between 300 kHz and 40 MHz. It is the latest in a series of products under this model number and replaces the 1020B.

There are other shortwave active antennas selling at half the price, but what's different about this product is that it is a *tuned* active antenna which features a much higher degree of sensitivity and selectivity than found on untunable active antennas.

Sporting a diminutive 17" telescoping whip antenna, you couldn't be blamed for doubting the ability of this product to perform. I know I was. It was about noon in the middle of June when I disconnected the external antenna from my Kenwood transceiver with built-in general coverage receiver and I attached the Active Antenna. I thought I'd try first for an East Coast amateur radio traffic net on 40 meters. There is a bypass switch on the front panel and you'll want to make certain that it's off before trying to tune.

♦ Testing on All Bands

First I set the gain control to "5" about halfway on the gain scale; next I set the band switch knob to the "D" position, indicating the 40 meter band on the tuning dial; then I slowly rotated the tuning knob to the 7 MHz area on the scale. Band conditions were not the greatest, but I could copy the net control station with an S-5 signal. I could even hear mobile stations.

Going up to the 20 meter band, I reset the dials for 14.300 MHz, the Maritime Mobile net – a good place to test an antenna as ham stations with varying power levels check in from all over the eastern half of the U.S. and Caribbean. The net control station was a solid S-9 as were many of the check-ins.

Now it was time to turn to the *Shortwave Guide* in the middle of MT and find out what I could hear. First up was Radio Netherlands. Resetting the knobs, which took only a couple of seconds, RN's 15.220 MHz signal was eas-

ily 10dB over S-9. In fact, I got excellent reception on all the big international broadcasters.

At night I tuned through the AM band to check on some of my favorites: WSM, Nashville, WLW, Cincinnati, WSB Atlanta, WCBS New York; all were S8 or 9. On the ham bands W1AW's code practice bulletin on 7.047.5 came in at 10dB over S9, WWV at 15 MHz was a solid S9, low power CW operators on the 30 meter ham band were easily copyable. Touring the rest of the international broadcasters brought in solid S9+ signals on the usuals: Vatican Radio, China Radio International, CBC, Radio Havana, Radio Taipei, HCJB, etc. I found that tuning the 1020C was much like using an outboard tuner, requiring adjustments whenever the frequency was changed. The adjustments, however, are small and quickly made.

I used the MFJ-1020C connected to an old Uniden 2021 portable shortwave radio and had excellent results. The BBC's 15.190 MHz channel at 1500Z was just audible on the portable, but with the 1020C it lit up all the signal LEDs and had a strong, steady signal. Of course, that same signal at the same time on the Kenwood with a good wire antenna was 20dB over S9.

♦ Psst, Wanna Amplify Some Noise?

I imagined SWLers would want to use the unit as a stand-alone outdoor antenna substitute, but, suppose you already have an outdoor antenna, what will be the effect of adding the 1020C to your existing antenna? In most cases it appears to act as an antenna amplifier. I saw reception increase from 7 S units, on a typical international broadcaster, to 20dB over S9: a formidable gain. However, I found that on the weak signals of DX broadcasters, the external antenna alone had much less noise than listening with the external antenna going through the 1020C. As with many other amplified antenna situations, it's likely you'll be adding more noise than signal when adding

an active amplifier.

♦ Pertinent Data

This unit comes with a 6 page instruction manual and has excellent pictures of the unit explaining each control and connection. There's also a handy schematic diagram on the last page.

The MFJ-1020C is very well made with sturdy knobs and a well designed and marked front panel. The bypass switch, strangely, doesn't have a very positive feel and at times it's hard to tell if it's engaged or not. The telescoping whip antenna is removable, which you are advised to do when you're using the unit as an amplified preselector for an external antenna.

The MFJ-1020C is compact, 6.5" wide, 2.5" high 3.25" deep, weighs only a pound and will fit anywhere your shortwave receiver needs to be. The front panel features a gain control, bypass on/off switch, band switch, tuning control and red power LED. The SO-239 input and output jacks are ham and SWL antenna cable-ready. The unit is powered for long term tuning at your listening post via an external power jack (12 VDC power adapter optional). Short term use at home or in the field is via one 9 volt battery. A solid, wing-nut-fastened ground post rounds out the back panel.

This product is not designed to replace the wire outdoor antenna for MW and SW listening. It is designed to help you enjoy your shortwave listening hobby even if you're not able to put up an outdoor antenna. As expected, it picked up nearby electrical interference from my computer and a dimmer switch in another part of the house, but with these devices turned off it worked properly.

The MFJ-1020C retails for \$79.95 plus shipping, the optional power adapter

is \$14.95 plus shipping, and it is available through many electronic mail order firms or directly from MFJ Enterprises, 300 Industrial Park Road, Starkville, MS 39759 or call their order line: 800-647-1800



The MFJ-1020C indoor tuned active SWL antenna .3 to 30 MHz lets you tune in the world even if you can't put up an outdoor antenna.

What's NEW

Tell them you saw it in *Monitoring Times*

Digital Scout

Pay attention: The new Optoelectronics Digital Scout RF frequency recorder is the *only* nearfield instrument capable of counting digital as well as analog signals from 10MHz - 2.6 GHz. Digital modulation types capable of detection by the Digital Scout include TDMA, GSM, Frequency Hopping Spread Spectrum (FHSS), APCO 25, ON/OFF Keying, TETRA and more. The Digital Scout is *not* capable of counting signals Direct Sequence Spread Spectrum (DSSS), CDMA and PCS.



Although the Digital Scout incorporates the patented Reaction Tune mode, this feature only works with analog signals. In Reaction Tuning, the Digital Scout captures a frequency and automatically tunes a compatible receiver to that frequency for instant monitoring. The following receivers (when provided with the appropriate cable) are compatible for Reaction Tune: ICOM IC PCR1000, R10, R7000, R7100, R8500, R9000; AOR AR8000 and AR8200; BC245XLT and BC780; OPTOELECTRONICS Optocom, Os456/Lite, OS535 and R11.

Another new feature of the Digital Scout is the calibrated field strength measurement. The Digital Scout displays field strength in dBm with a signal strength bargraph serving as a reference. This feature is great for checking nearfield RF levels at remote sites, locating hidden transmitters, determining power levels from two-way radios and more.

The Digital Scout has a built-

in RS232 interface that can be used to connect to a PC for downloading frequencies saved to memory or for real time datalogging. Software and CBDS interface cable are sold separately.

Like most conventional frequency counters, the Digital Scout will display the actual measured frequency coming from a transmitter, such as 454.1247. However, it can also display the actual channel frequency of the transmitter, such as 454.1250. The unit has a 1000-memory capacity with up to 65,000 hits per memory. This information can be downloaded directly to a PC for further processing using the Optolinx interface.

The Digital Scout is \$459 from Optoelectronics, Inc. 5821 NE 14th Avenue, Ft. Lauderdale, FL 33334; call 1-800-327-5912 in the U.S. or visit <http://www.optoelectronics.com> for more information.

Twice the Input

Of unique interest to dyed-in-the-wool DXers is the Dunestar two-radio headphone switch. Of course, Dunestar intended this product for the "single op two radio" ham radio contesters, but serious DXers and newshounds will find it suits their needs as well. Take the headphone audio from two radios and combine into one stereo headphone set, then mix or switch from one to the other.

Scanner listeners can listen to communications from two scanners at once—a boon when public safety channels are hopping during an emergency response. (I met a reporter during a Shuttle launch who listened to four inputs simultaneously; one in each ear and one on each external speaker!) DXers can sit on a quiet frequency while logging an active one. When the propagation comes in, you can instantly switch to either channel. Here are



your options:

MIX - Continuously variable from LEFT radio to RIGHT radio

LEFT - Left plus right phone to LEFT radio

STEREO - Left phone to LEFT radio, Right phone to RIGHT radio

RIGHT - Left plus right phone to RIGHT radio

The Headphone Switch Model 842 is \$49.00 from Dunestar, P.O. Box 37, St. Helens, OR 97051; 1-800-457-1690; or visit <http://www.qth.com/dunestar>

Antenna Book

Radio Works is probably best known for their Carolina Windom antenna, and owner Jim Thompson has recently published a book based on the most frequently asked antenna questions of his customers.

In fact, the title of the 120 page book is quite a mouthful: *Frequently Asked Questions About Antenna Systems and Baluns, plus Exploring Popular Antenna Myths*.

The material is presented in a style that's easy to read and Jim, W4THU, is not beyond poking fun at jealously held concepts that don't quite hold up under close scrutiny, such as "If it didn't fall down last winter, it wasn't big enough!" "Coax is coax. So what if it's 15 years old." or "You can't be a DX'er with a dipole."

However, at the heart of this book are questions that a lot of hams ask over and over again. Do resonant antennas really outperform nonresonant antennas? What is the effect of letting your antenna droop in the middle? What is the difference between a Voltage-balun and a Current-balun? and much, much more.

Radio Works is currently selling the book at a discount \$10.95 plus \$3; if you buy a product along with it, pay only \$8 and free shipping. *Frequently Asked Questions* should also be available soon in CD. Contact Radio Works at 800-280-8327 or write Radio Works, PO Box 6159, Portsmouth, VA 23703, or visit <http://www.radioworks.com>

2002 M Street Radio Directory

For AM DXers who take their hobby seriously, the 2002 *M Street Radio Directory* will be available at a discount from the IRCA Bookstore. The *Directory* contains a complete listing of over 15,000 radio stations (AM/FM, US/Canada) including the following information: facilities, ownership, formats, LMAs, station personnel, phone numbers (and FAX), addresses, ratings, as well as information on almost 400 radio markets in the US and Canada.

Stations are listed by location (complete info), frequency (frequency, call, location, power and pattern) and call (call, frequency, location) and market (frequency, call, location, rating, format). It also includes a former call reference (old call, location and current call). Major network information (addresses/phone numbers/etc) and several interesting radio articles are included as well.

The book is expected to be published mid-July. Even with the \$9 discount (good until the end of 2002), the price is still a hefty \$70 plus shipping and handling (\$7.00 to US, \$17 to Canada or \$25 to Europe). Checks and Money orders should be made out to Phil Bytheway, and sent to: IRCA Bookstore, 9705 Mary NW, Seattle WA 98117-2334

New Venture by WRTH

The *World Radio TV Handbook* is an essential reference source for radio hobbyists and professionals alike. Even though it is updated yearly (with publication around January), it loses accuracy during the summer season's frequency and schedule changes. *WRTH* is trying to change that with its announcement of volume 1 of *The Shortwave Guide*—a 224-page guide to be released in June providing shortwave schedules, frequencies, and languages in a graphic format similar to that used by *Passport to World Band Radio*.

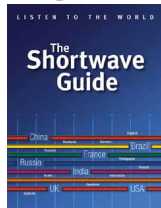
Columns show frequency, name of the station (domestic broadcasts in italic type), country originating the broadcast, transmitter power, duration of each broadcast in

What's NEW

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UTC, language (shown by color), target area, and the days on which the broadcast is made.

The *Shortwave Guide* is available for £12.99 or US\$17.95 including airmail postage. Purchase online at <http://www.wrth.com>, by fax to:

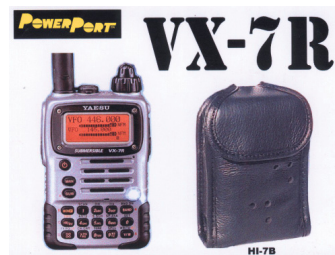


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Glove Your Radio

If you are the owner of the new Yaesu VX-7R, or of any of the new micro-radios from Yaesu, Alinco, Icom, Kenwood, or RadioShack, you want to give your ham radio or receiver the protection it deserves. Cutting Edge Enterprises has a

PowerPort Radio Glove to fit almost all models. The Radio Glove is a high quality leather pouch with a spring-steel, leather-covered belt clip. A top flap grants access to the display and fastens securely with Velcro. The PTT button is easily accessible even



with the radio in the pouch. Pouches for wide-frequency-coverage models come with a pocket for the extra antenna tip.

The PowerPort Radio Glove is only \$19.95 from Cutting Edge Enterprises, 620 Highland Avenue, Santa Cruz, CA 95060.

Other models are also available with swivel belt clips, lapel fasteners, pocket pouches etc. Visit <http://www.powerportstore.com> or call 800-206-0115 for more information. Click on a handy link to see if they have a pouch to fit your particular radio.

But wait, there's more! Especially great for outdoor use are cases made of wet-suit-grade neoprene for great cushioning and waterproofing – a bargain at \$14.95. Many of the leather and neoprene pouches will also fit FRS and GMRS radios and GPS receivers. (Check the online chart for your model.) Neoprene pouches are available in three sizes (and two colors) to fit any unit 5-1/2 inches or less.

Jade Products Closes

We had recently heard about an intriguing product: an optically

coupled regenerative (OCR) receiver in kit form from Jade Products. However, when visiting their website to learn more about the OCR receiver, we were sorry to read the following notice about this company and its innovative kits:

"As of June 1, 2002 Jade Products, Inc. is no longer in business. We will continue to support our products. If you have a question about our products, please contact us between 6 and 10 pm EST at 603-329-5465 or send e-mail to klypp@yahoo.com"

Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to mteditor@grove-ent.com.



Model:

LA350, Active Loop Antenna

Frequency range:

350S element: 3.0 MHz ~ 9.0 MHz --- Standard
350H element: 9.0 MHz ~ 30.0 MHz --- Standard
350L element: 200 KH ~ 540 KHz --- Option (under development)
350M element: 540 KHz ~ 1600 KHz --- Option (under development)

Operation Gain:

13.5 dB typ

IP3:

+30 dBm

Standard Accessories:

350 S element, 350 H element, AC adapter, instruction manual, 20 inches long of coaxial cable with BNC

AOR LA-350 Active Loop Antenna

AOR has just released a wide-frequency-coverage loop antenna system for indoor reception of long wave, medium wave, and short wave signals. Currently supplied with loops for 3-9 and 9-30 MHz, the company indicates that loops for 200-540 kHz and 540-1700 kHz should be available shortly.

Utilizing an internal 13.5 dB gain amplifier with an impressive +30 dBm third-order intercept, the pattern is quite sharp, and the frequency-tunable amplifier offers good selectivity. The loop is enclosed in a rigid aluminum Faraday shield to reduce pattern-distorting capacitance effects. Our lab test verified a sharp loop pattern which easily discriminated between desired signal paths and ambient noise sources, as well as separating incoming co-channel signals.

The loop is mounted on a conventional 1/4" audio plug which swivels into the host jack on the top of the control box. Power is supplied by 12 volt wall adaptor, inviting battery operation for hum-reduction requirements. A 20" BNC/BNC coax interconnect cable is included; this will require the after-market purchase of a suitable adaptor for virtually any receiver external antenna connector.

Key features

- ▶ The LA350 is a new short wave desk-top active loop antenna.
- ▶ The LA350 is supplied with the two (2) interchangeable antenna elements as standard covering 3.0 ~ 9.0 MHz and 9.0 ~ 30.0 MHz loop (12 inches diameter).
- ▶ The LA350 has a tuning control to peak performance and elements may be rotated to enhance reception and hull unwanted interference.
- ▶ The LA350 has a built-in high gain (13.5 dB) signal amplifier and has a high IP3 (+30 dBm).
- ▶ The LA350 is ideal to place in a suitcase for occasional traveling. Two additional bar antenna elements are available as options to further extend the operation frequency coverage.

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- Charles (Chuck) Boehnke
Keaau, Hawaii

"You and the MT staff that put this project together have done a FANTASTIC job. You would seem to be the leaders in the field presenting material in this manner so it can be archived so easily. This is the way to receive a magazine."

- Don Nauer

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Going Wild over Wireless

by Bob Grove

Spread spectrum, frequency hopping, cordless phones, TDMA, CDMA, HDTV, GSM, LANs, trunking, spectrum refarming...just a few of the terms that most of us rarely heard in the halcyon days of hobby radio listening. But with the advent of digital communications, computer control, cellular phones, wireless video, LANs, and the Internet, these and other spectrum-optimizing technologies have come to the fore.

However, all this new technology comes with a price. The need for new wireless systems has begun to exceed the current reserve of frequencies to house it. Even though digital transmissions were supposed to be a partial solution to the spectrum crowding problem, reports of interference are increasing. Naturally, dense-population neighborhoods and businesses report it the most.

A recent news story reported typical incidents of wireless interference: In New York, a security gate slowed down the entire wireless network of an adjacent business throughout the work day; in North Carolina, a customer's Internet access slowed to a crawl because his neighbors were using the same wireless system.

Much of this debacle is the natural result of the more popular systems being the products of choice, with the inevitable result that adjacent systems are choking their users by time-sharing the spectrum. And with plummeting prices, it can only get worse as the technologies become more affordable, and applications become more imaginative.

Schools, businesses, scientific institutions, transportation, public safety, medical facilities, retailers, consumers – all are looking for ways to more easily intercommunicate, exchange information, manage utilities, assure security, monitor inventory, and control remotely. It has been estimated by one statistics firm that the \$2 billion dollar sales prediction for this year will pass \$5 billion per year within three years.

Commonly reported is Wi-Fi, more properly known by its industry wireless protocol classification: IEEE 802.11b; another is Bluetooth. While the traditional UHF spectrum assigned to many of the early and current systems is the familiar 902-928 MHz band, formerly known as the Industrial, Scientific, and Medical band (ISM), these newer technologies have moved higher in frequency, concentrating on the 2400-2483.5 MHz swath of spectrum. Already sharing this band, however, are microwave ovens, laptops, electronic cash registers, cordless phones, and energy-saving lightbulbs. Neighboring frequencies are used by the start-up satellite radio industry, which wants the government to require a reduction in signal strength from these new license-free users to avoid potential interference.

Even though a large number of frequencies are available, commonly-manufactured equipment rarely allows a liberal choice among these channels, if even more than one. Users must take pot luck among the systems available at the point of sale, and even if they are aware of the channel choices – assuming they have some – they don't know what frequencies their neighbors are using, or what frequencies will be occupied by future equipment moving into the neighborhood.

At the lower frequency ranges, with increasing population and more RF devices and communications equipment, we see changes at HF and VHF as well. Refarming of the spectrum has reallocated some major chunks to growing services, much of it coming from the military sector. And we have seen narrowing of bandwidths in other parts of the spectrum, allowing more signals to be squeezed in.

These steps might be adequate if radio were only required to perform the same duties as in the past, but "wireless" signals are now expected to carry all kinds of information, and complex data requires wider bandwidths. Recently, the FCC has proposed wideband technology spectrum to accommodate this need. And that takes us back to microwave and spread spectrum techniques.

In spread spectrum, the information is first converted into digital bits, which, in turn, are spread in a pseudo-random pattern across a wide bandwidth. Because each individual bit occupies such a tiny amount of spectrum for such a short period of time, and because the receiving stations are synchronized to listen for those bits, many users can utilize the same piece of spectrum simultaneously with no apparent interference, even when signals are below the noise level.

However, according to ARC Electronics, even spread spectrum techniques are vulnerable to "collisions" and tend not to perform well in close proximity to each other.

Is interference inevitable?

So how might the wireless industry respond to the growing threat of co-channel interference? In several ways: Lower power, directional antennas, more frequency choices, frequency coordination in areas of user density, better economy of bandwidth, and the inevitable campaign to get more spectrum, to name but a few of the more obvious. Interference could be lessened if all the transmitters on a given band observed the same protocol, but most new wireless devices are being built in the unlicensed (and largely unregulated) bands, and observe no common etiquette.

FCC regulations do limit the signal strength of each unlicensed transmitter, but not the total number of transmitters or distance between them. Therefore a network such as Metricom Ricochet may blanket an entire neighborhood, and a wireless network or LAN in the same band would be rendered useless.

The issue of privacy and vulnerability of wireless networks is another growing concern. In a recent foray through several Baltimore neighborhoods, three computer techies discovered 136 vulnerable wireless networks in less than two hours. Only 52 of them were protected, most by an inexpensive and flawed encryption system. Anyone could have logged in and used the connection from outside the building. With a little more effort, they could probably have accessed the company or family computers.

"Everything old is new again"

It's somewhat ironic that "wireless" – a term from radio's early years – is the latest buzzword in today's technology market. There's an air of excitement over potential applications for radio waves, and companies are racing to harness wireless to every imaginable use, hoping to capture the consumer or government market.

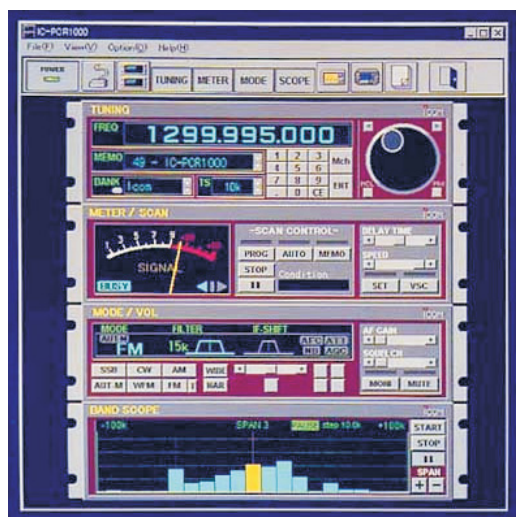
The sales hype may imply that RF is an endless natural resource easily harnessed and put to innumerable uses – all faster and better. But, when a cordless phone knocks out the LAN in the neighboring office; or an older analog VHF radio is able to reach inside buildings that the hottest digital UHF system can't; or the fastest data system gets trumped by gear that's older and cheaper, just remember there are some rules that human ingenuity can't get around. And in those license-free bands, if the FCC won't do the coordination, Mother Nature will.

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